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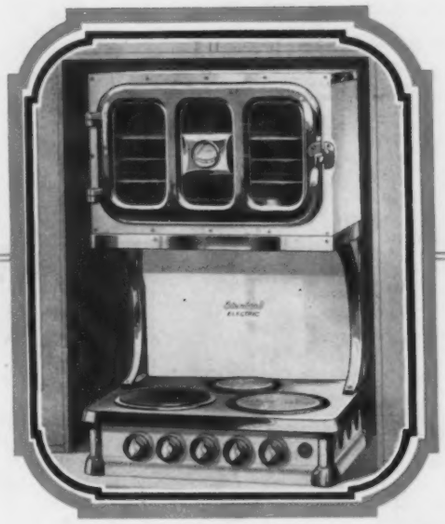
Journal of Electricity

Devoted to the Economic Production and Commercial Application of Electricity
IN THE ELEVEN WESTERN STATES



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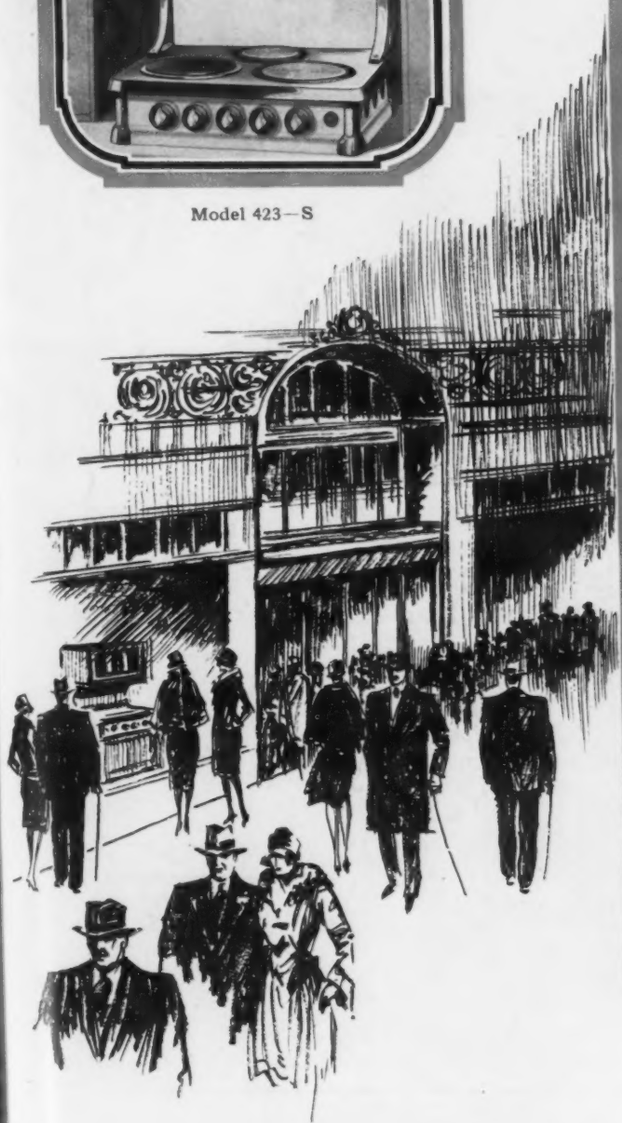

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IN THE ELEVEN WESTERN STATES

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Personal Representation

NOT all members of an association find it possible to attend its conventions. Not all workers in an industry can drop the work at hand to listen to and discuss means of improving that work. For service must be rendered continuously at home.

If those who go to the conventions to take part in these discussions could bring back and relate to their fellow workers every salient detail of the proceedings, that condition would approach perfection. Yet few have the faculty to report successfully all phases of thought brought out in a convention, even if it were physically possible for them to tell all their fellows what they heard there.

It is here that the Journal of Electricity serves the individual member of the industry as not even those who attend the conventions may. At the Pacific Coast Electrical Association convention in Los Angeles, June 8-11, and at the Northwest Electric Light and Power Association convention at Spokane, June 14-17, the Journal will have trained representatives there for you, to report all the salient details of the proceedings. These men, from experience and training, know how to bring you a graphic picture of the convention, digest its important thoughts for you, and present the story in attractive form to be read at your leisure.

In its publication of the convention papers of both these associations, the Journal prepared the way for those who attended the meetings and gave those who could not attend the meat of the year's work of the numerous committees. In its full reports of the conventions themselves, in the July 1 issue, the Journal will provide a section-by-section view of the industry's work for the year.

Declaration of Independence

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EDITORIAL

Gifford Pinchot and His "Giant Power" in Reverse

WAS it a last-moment qualm that after all "Giant Power," whatever it was, would not nominate him to the senatorship of Pennsylvania that caused Gifford Pinchot, whilom figurehead of a movement to place power production among the other inefficient government enterprises in the realm of business, to issue his little brochure, "GIANT POWER, What IT IS and How TO GET IT" (the capitals are his)? If it was a qualm, Governor Pinchot guessed more nearly right in this instance than he has done on electrical development problems so far, for the recent primary election left him very much out of the race. In fact he practically had elected a man conceded to be inferior to Mr. Pepper, who lost because Mr. Pinchot drew from him many votes to which he was entitled.

For many years Gifford Pinchot has mouthed the words "Giant Power" as if there were in them some new kind of charm, some potent magical significance. But if his little pamphlet did not nominate him, it did one thing. It explained what "giant power" is. And one cannot be too sure that the only magic he was able to perform was the magic of disillusionment, and that it "hocus-pocused" him out of office most effectively.

For here is Mr. Pinchot's definition of the difference between "super-power" and "giant power," his own pet:

"The unification of the electric network into a single nation-wide system by the interconnection of regional pools of power is clearly indicated. The process, driven by the motive of profit, hampered by the mutual jealousies of the profit seekers, unaided and unchecked by public guidance for the common good, is super-power. We could not stop this process at any step if we could. We can and we should aid it and guide it for the common welfare. So aided and guided it is Giant Power. Between these two ideas there is an irrepressible conflict in which, as many signs foretell, the zero hour is at hand."

So this is "giant power!" It would seem that Mr. Pinchot was a bit behind times with his wonderful discovery. By this token if power development is not regulated and guided today for the common welfare by the public service commissions of practically every state in the nation, Mr. Pinchot, by his undue precocity would be the last to find it out. As for the zero hour, if it was ever at hand, it passed quite uneventfully some years ago.

Another "startling discovery" made by Governor Pinchot was that state or government ownership would not accomplish the job. He says: "Adequate public control must be established without delay. A system of private ownership under public regulation, though imperfect, is now established in every state and in the great majority of cities. A general system of public ownership could not be established throughout the nation or in many states without long delay in preliminary discussion. This delay would give the monopoly time to dig into a strong line of defense. We must at once make the system of private ownership as serviceable as it could be made by forceful public regulation."

From the pages of his little booklet one finds phrase after phrase devoted to expounding principles so well established already that to read them makes one wonder if it is Rip Van Winkle who is speaking and these his remarkable discoveries as to how the world should be run, when that world already has gone far ahead of his brilliant "discoveries."

If Governor Pinchot had started out to write a story of Jack the Giant Killer, his brochure might well have gone into literature as a gem of fairy folklore for children, but if he is concerned with discovering new ways for the advancement of civilization surely it might be well for him to be sure that he is not discovering the obvious and thereby making himself ridiculous.

The Fixed Idea About the Wynooche

WHEN an idea becomes fixed in the public mind it is hard to shake loose. A certain group of people in the Northwest have been led by specious argument of municipal-ownership proponents to believe that hydroelectric power is cheap, that cheap power brings industry, and that the best means of producing the desired conditions as to power supply is through municipal ownership and operation. Seeing the strategic position of the district of Gray's Harbor, Wash., as a potential field for power utilization and the presumably excellent power site on the Wynooche River near Aberdeen, these proponents inserted their wedge at this point and convinced those people that always are susceptible to this sort of thing that the municipal development of the Wynooche was just the thing Aberdeen needed to put it on the map.

Along with this basic idea has been fixed another —that $2,000,000 will develop it adequately and

economically. Some years ago an engineer, without having exhaustive data at hand, estimated its cost at this figure, and later and less complete reports, accepting these data as conclusive, found substantially the same cost. Now it appears that the people expect engineers to use this figure as a premise, and, working from it rather than toward it, to set up a column of costs that will add to about that total. In short, the idea that the Wynooche will cost $2,000,000 has become just as firmly fixed as is the original idea that the Wynooche would make a good municipal development.

But shrewd guardians of the public interest deemed it wise to seek advice from various sources and had the city retain the engineering firm of Stevens & Koon, Portland, to make a report. Imagine the chagrin of the proponents when these engineers, after a thorough examination of more complete data than were available for former reports, found that it would cost $4,500,000 to build, and that it would require nearly $1,000,000 additional to offset its operating deficit until it should become self-supporting. These engineers worked independently of their predecessors; took nothing for granted; studied the situation carefully; attacked the problem from a detached, professional standpoint, not colored by personal prejudice. They noted the character of the ground; studied the stream-flow records; recommended a certain sized development in steps as the most economical cost-per-horsepower development possible; estimated the growth of the community; recognized that the city would have to compete with an established company in marketing its product and that it couldn't get all the business at once; and, finally, advised the city to defer the development, and, if it was intent on entering the power business, to build a small steam plant with which to acquire sufficient load to warrant the construction of the larger development later.

Of course this report was unsatisfactory to the proponents of the project on the city council, the private utterances of whom we imagine to have been as follows: What heresy is this? Don't these engineers understand that the people know the Wynooche project will cost $2,000,000? Don't they know that this is a hydroelectric project involving the use of the people's God-given heritage and not merely a proposition of finding an economical way to go into the power business? Don't they appreciate the fact that we can't write a snappy story about a steam plant, or paint a pretty picture of a fuel pile by a tall stack? Don't they realize that in order to get the people to vote the bonds our "ad" writer must have material around which to weave some romance?

Publicly they said they wanted more information and retained W. J. Roberts, consulting engineer, Tacoma, to make a report. His report stated that if former estimates (exclusive of Stevens & Koon's) were correct, and if the community grew at a certain rate, the project would be entirely feasible and would be profitable from the start. Fine, we can imagine the politicians saying, this is something we can show the people. Thus do municipal-ownership enthusiasts seek the facts.

Promptly on receipt of the Roberts report the city council proposed, through ordinance, a special election to vote $2,000,000 of bonds for the project. The outcome will be watched with interest. Will the people demand the truth before voting, or will they accept the appearance of truth as presented by those whose ideas are fixed and unchanging in the face of any sort of contrary testimony, or by those who want municipal development at any cost? What would be the status of the Skagit development today if the people of Seattle had known in 1918 that it would cost upward of $13,000,000 instead of $5,000,000 as they were told?

Electric House-Heating Warrants More Attention from Industry

THE electric industry as well as the major portion of the general public does not appreciate the fact that electric heating for residences and apartments is proving an outstanding success when properly installed and properly sold. The development of this class of business has been pioneered by a small handful of enterprising men on the Pacific Coast who have gone ahead despite lack of co-operation, and in some cases in the face of actual resistance on the part of other men in the industry who either have been misinformed or who have been too disinterested to learn the facts.

Attention can be directed to any number of installations in California, Oregon and Washington where electricity performs all of the household burdens from cleaning the rugs to cooking the meals and heating the house. Then there are many apartment houses which are completely equipped with electric appliances and which, according to the assurances of the owners, are in particular demand among tenants.

Data covering ten homes in Seattle recently have come to the editor's desk that bear out these statements. All of these homes have electric ranges, water heaters, the average number of other household electric appliances and, in addition, heating installations varying from 8 to 29 kw. The number of rooms varies from 3 to 7, the number of electric heaters from 8 to 17. The bills for electric service, covering lighting, heating and cooking, are surprisingly low and compare favorably with the charges for the same services, irrespective of the character of the fuel used. For the smallest installation the average monthly bill for the year 1925 was $8 per month; for the largest installation, which included 29 kw. in heaters in a 7-room house, the average monthly bill was $17.35. The maximum average monthly bill for all ten installations was $18.60, this in a home with 24-kw. in heaters.

In the face of data which is at hand and of experience with this application of electricity to date, it would seem that electric house-heating deserves more attention from the industry than it is receiving. It is high time that the industry itself should be sold on this application.

Are Some Executives Suffering from Case of "Sales Bashfulness"?

MANY utility executives apparently put on an entirely different suit of mental garments when they turn their attention to the matter of merchandising than they are accustomed to wear when considering the ordinary problems in selling electrical energy. In an excellent article entitled "Light—A Merchandising Opportunity" in the May issue of "Light," James E. Davidson, past president of the National Electric Light Association, coins the phrase "sales bashfulness" to describe the attitude of many of our public utilities toward appliance sales. To quote from Mr. Davidson's article: "Looking back into the history of our feeble efforts at merchandising, I recall how bashful we were about the electric flatiron. Our imagination was paralyzed by the thought of asking folks to pay $2.50 for one of our electric irons when they could buy a cast iron sad-iron for 35 cents at the hardware store. I recall that we had similar timid inhibitions in the matter of electric signs. I have observed the same diffidence within the past year with respect to kitchen lighting units. We offered cheaper fixtures than the public was willing to pay for and equipped them with smaller lamps than the public would gladly buy."

To correct this condition Mr. Davidson has three suggestions: first, engaging of men who have the selling instinct; second, the granting to these men of a compensation commensurate with that paid in the market place, basing this compensation upon the net value of their work as load-builders and not solely upon their ability to sell merchandise at a profit; third, a properly organized sales program which will meet the load-building needs of the utility and at the same time serve the public to whatever extent the public properly may desire. A careful consideration of these three precepts will lead the thoughtful individual to the conclusion that they are the "without which not" of a successful merchandising policy.

Oakland Water and Power Project Is Subject of Excellent Report

EXTREMELY worthy of comment are two phases of the recent report on the power possibilities of the Mokelumne River prepared by Lester S. Ready, chief engineer of the California Railroad Commission, for the Citizens' Water Committee of the Oakland Chamber of Commerce as reported in the news pages of this issue. Mr. Ready in his report states that the substitute plan offered by the committee for the Lancha Plana water project upon which that section of California now is embarked, even though a considerable amount of power is involved, will not decrease the cost of water to the public one cent.

In graciously accepting this report the Oakland sponsors of the combined water and power project have displayed a marked spirit of broadmindedness. In securing expert testimony as to the feasibility of the project before definitely launching the city into a program of expenditure whose final total would remain in doubt, the Chamber of Commerce has adopted a broadgage viewpoint that is unique, because many municipalities under similar circumstances have blundered into costly programs with no careful investigations as to the ultimate outcome.

Furthermore the selection of the Railroad Commission's chief engineer for a task of this kind reflects to the credit of that body. The accuracy, detail and unbiased viewpoint disclosed by the report gives an indication of the fairness, justice and precision of the investigations by the commission's engineers in matters of rates for public-utility services relating to the public.

On the whole, the report is a credit to its sponsors, its author and the people of the East Bay district who in the long run are the actual beneficiaries.

The Public Be Told

CHANGES in the viewpoint of those entrusted with the conduct of our large industrial organizations are taking place that seem to have elicited little or no comment. Nevertheless, these changes are really radical in their nature, if comparison is made with conditions as they existed only a few years ago.

Consider the almost brutal frankness of the present-day financial statements of great corporations. The story is there, be it favorable or unfavorable. The public is told in great detail just what have been the results of the last year's operations.

Then there were the so-called "trade" secrets, so jealously guarded in the old days. Nobody was allowed to tell anybody anything if it could be avoided. Manufacturers used all sorts of freak sizes, gages and standards so that they might, presumably, have a "cinch" as far as orders for repairs were concerned.

Now, competitors in the same line of business sit down at the table together. They co-operate in the adoption of standards by which a greater interchangeability is brought about, all for the benefit and better service of the consumer. They promote general educational research and advertising that the public may be informed thoroughly and protected against that which is shoddy and below standard.

Even the holy of holies, the plants where the goods are manufactured, are open to visitors. "Visitors Welcome" has taken the place of "No Admittance," and "Keep off the Grass" is no more. How different this all is, and how much better to let the sunlight of frankness into the darkness that formerly obscured the ways and processes of industry!

AT first glance looking like the Colorado River, the rugged setting for the Horse Mesa dam of the Salt River Valley Water Users' Association takes the ingenuity and resources of the engineer. The work on the dam, as it appeared April 15. Barges in the foreground carry gravel excavated by the floating derricks to the inclined track on the south haunch of the dam. The 340-ft. Insley tower rises from the track from a point 300 ft. above stream bed.

Selling 11,500 Customer-Owners in Five and a Half Days

By James Lightbody

Publicity Manager, British Columbia Electric Railway Company, Ltd., Vancouver, B.C.

IN its initial customer-ownership effort the B.C. Electric Railway Company established a most remarkable record, obtaining 11,500 customer-owners in the short period of five and one-half days and at the same time over-subscribing the issue offered by $2,155,300. In this article the author deals with the steps which led up to the campaign and the publicity which was used to make it a success.

IT was with some trepidation that plans were launched a year ago by the British Columbia Electric Railway Company, Vancouver and Victoria, for embarking upon the customer-ownership idea. As has been announced in the news columns of this magazine, any fears proved to be groundless because out of a population of 350,000 the company received applications for $7,155,300 worth of 6 per cent cumulative preference shares in its subsidiary, the British Columbia Electric Power and Gas Company, in five days and a half, obtaining 11,500 customer-owners in its effort.

Among the conditions which made the prospects doubtful, to say the least, was the comparative lack of knowledge regarding investments on the part of the general public of Vancouver. With the exception of the regular investing public, very few people in the city owned or ever had owned stock. Many had owned Victory bonds but these mostly had been sold for homes or automobiles.

Again, little was known as to the general wealth of the British Columbia communities. They had come through hard times during the war and even at the present day the number of wealthy men is possibly lower than in other cities of similar population. A large proportion of the population is of the wage-earning class, which was hard hit during the slackening of industry from 1914 to 1918.

What was not recokoned with, however, was the thrift of these people and the other non-investors who had been putting dollar after dollar into the savings banks during the last five or six years. They had been steadily buying their homes and liquidating their obligations, and now there was a large volume of ready cash belonging to these people in the banks.

Looking back, these facts are readily apparent but when facing the launching of a customer-ownership campaign, several questions seemed uppermost in British Columbia. Was $2,250,000, the original offering, too much for 350,000 people to absorb? Would people who had been used to real-estate buying and similar forms of speculation be attracted by a safe, steady dividend of only 6 per cent? Was public opinion sufficiently favorable towards the British Columbia Electric Railway Company and all public utilities to induce investment by the non-investing classes?

About a year before the campaign was to be launched George Kidd, president of the company, placed details of the matter in the hands of a committee of three, consisting of the general secretary, the comptroller and the publicity manager. The price of issue, the amount, the terms and many other details were thrashed out, and the plan of campaign decided upon was an orthodox one used by other companies. As this was the first customer-ownership venture, it was not thought to be the time for experimenting.

The British Columbia Electric Railway Company is an English company and all its shareholders and most of its bondholders live in Great Britain. To make customer-ownership possible it was decided to organize a new subsidiary company under British Columbia laws, which would avoid the disadvantages of British income tax and British money units. The formalities of getting this new company, named the British Columbia Electric Power and Gas Company, launched took considerable time and were not completed until a few days before the customer-ownership campaign was due to start.

At the outset the committee decided to use the time available inducing a favorable frame of mind on the part of the public towards the company and public-utility investments. For many years the company had been using publicity continuously but largely to solve problems of the moment, such as jitney competition, the need of higher fares, municipal-ownership agitation and so forth. There had been times when the balance of opinion was somewhat against the company and when favorite election platforms were "anti-B.C. Electric."

The change in public opinion possibly is due to a large extent to the steady educational work that has been carried on. It is also true, however, that with the material prosperity that has come in recent years people have become more tolerant. The

old spirit of criticism was due partly to the reaction of the war.

Then, too, there is nothing which promotes good feeling towards a public utility company so much as a program of construction. During the last five years the British Columbia Electric Railway Company spent $12,000,000 on new construction. Last year the amount was $4,500,000. The company was one of the first to throw itself into the building program, anticipating the present building boom by at least three years. Possibly the height of the company's popularity was reached when it announced in September, 1925, that it would proceed with the development of Bridge River at a cost of $13,000,000 for the first stage and $30,000,000 for the first four stages. The public likes a free spender.

Such has been the peculiar nature of Vancouver people that the company in the past has been reluctant to publish figures showing the growth of business. In spite of a desire to prove the expansion of the communities it served, the company found by experience that any figures published generally were seized upon by politicians and wrongly used to argue for more service, lower fares or lower lighting rates. One of the first moves decided upon was to reverse this policy. It was realized to be necessary to "talk up" the electric power, transportation and gas industries if people were to have such faith in them as to induce them to invest their savings in them. Figures were published showing how the power output was growing at the rate of 10 per cent per annum, how the street railway system, carrying 71,000,000 passengers in 1925, had exceeded all previous records, how the amount of gas manufactured had nearly trebled in ten years and so forth.

The fundamental points which the company endeavored to impress upon the public were somewhat as follows:

(1) The essential nature of electricity, gas and electric transportation in the community.
(2) The progress being made by public-utility companies in general and by the British Columbia Electric Railway Company in particular, including the increase in the demand for its services.
(3) The extent of the company's property, the amount already invested and the program of future expansion.
(4) The policies and ideals of service of the company.

About six months before the date set for the campaign the company conducted five excursions to its Stave Falls plant, having as guests members of the provincial legislature and civic and municipal councils, bankers, financial men, business men, engineers and newspaper men. Although at this time the public knew nothing of the proposed issue of shares, these trips had a marked effect upon the sale.

The company also has been pursuing a policy of steadily reducing its domestic lighting rates since 1917, when the rate in Vancouver was 8.8 cents net per kw-hr. In 1925 it was 5 cents net with a secondary rate based on a certain consumption per 100 sq.ft. of 2 cents. In the fall of that year the company announced, first, a reduction of more than 10 per cent in its commercial lighting; second, a reduction in its small power rates, and third, on Jan. 1, 1926, a reduction in the domestic lighting rates in Vancouver from 5 cents to 4½ cents net per kw-hr., dropping to 2 cents in the second step.

This progressive policy of reducing rates and building power plants in anticipation of future growth won unanimous approval for another reason. In spite of the fact that Vancouver is surrounded by streams and has an ample rainfall, there is nearly always a shortage of water for sprinkling purposes each summer. Whatever may have been the cause, the newspapers and the public generally contrasted the forward-looking policy of the British Columbia Electric Railway Company and its great projects with the inadequacy of the water supply of the city authorities.

These matters are recited because, when the sale of shares was commenced, sales were made almost entirely upon the public's opinion of the company formulated as a result of past performances and only slightly because of actual selling effort.

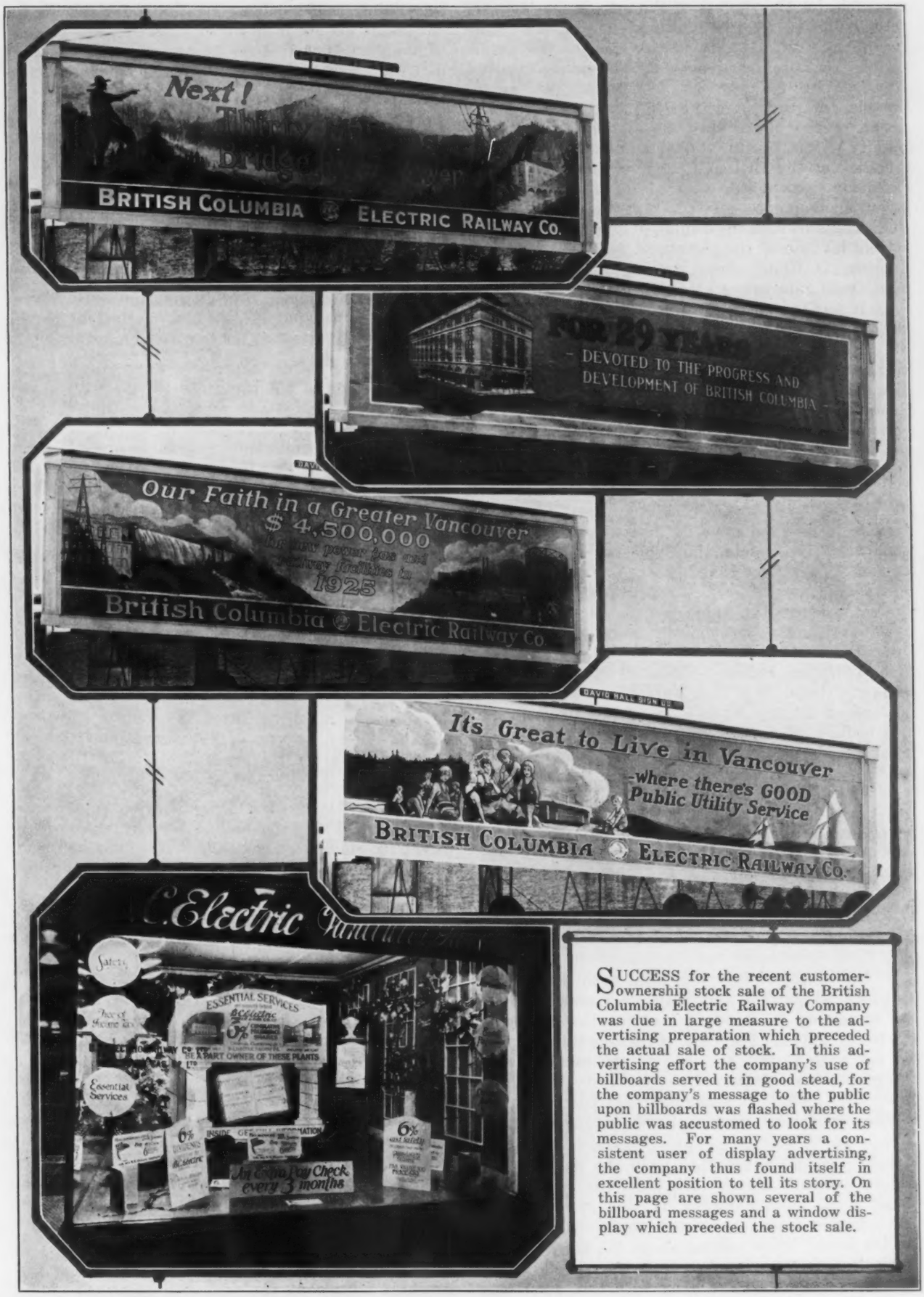
As proof of the way public good will had been won, it may be mentioned that, as contrasted with various municipal-ownership agitations in the past, agitation in December, 1925, failed to excite the people of Vancouver in any way and died a natural death. An effort was made by some recently arrived promoters to nominate and elect a slate of aldermen pledged to a municipally owned power scheme. Not only could no slate be nominated but the two candidates who enlisted under the banner were left at the foot of the poll in their respective wards.

The work of the campaign began about three months before the date set for opening the sale. Following out the fundamental points already set out, publicity was released through four main channels, showing the expansion of the company, the growth of water power development, gas manufacture, etc. These channels in order of the strength used were (1) the company's weekly publication in the street cars, (2) street car cards, (3) newspapers, and (4) illuminated billboards and posters.

An effort was made to familiarize the public with the physical properties of the company, such as remote power plants, substations, dams and so forth. All advertising carried cuts of such properties; billboards displayed them in vivid colors, and an automatic stereopticon in the company's main interurban stations flashed picture after picture before hundreds of persons.

An essay competition for employees, although conducted in midsummer, uncovered a great deal of talent and directed much attention to this phase of company policy which was to have a marked bearing on the outcome of the customer-ownership campaign.

As far as any predetermined campaign was re-



SUCCESS for the recent customer-ownership stock sale of the British Columbia Electric Railway Company was due in large measure to the advertising preparation which preceded the actual sale of stock. In this advertising effort the company's use of billboards served it in good stead, for the company's message to the public upon billboards was flashed where the public was accustomed to look for its messages. For many years a consistent user of display advertising, the company thus found itself in excellent position to tell its story. On this page are shown several of the billboard messages and a window display which preceded the stock sale.

sponsible for the success of the sale, it may be said that publicity as just outlined had a most far-reaching effect. It opened the eyes of the public to the great progress being made by public utilities. It raised the electrical, gas and street railway industries in people's estimation and gave them a vision of the places they would hold in the community of the future. It further showed them the stability of the British Columbia Electric Railway Company, which was engaged in catering to such essential demands—services that were not subject to fluctuations with the coming of good or bad times. Herein lay one of the secrets of success. The non-investor is timid about putting his money into many local enterprises. Many had been "stung" before. It was the absolute faith of the man or woman with a few hundred dollars in the savings bank in the integrity of the "B.C. Electric" and its management that made them eager to hand over their money for shares. In this regard the characters of George Kidd and W. G. Murrin, president and vice-president, respectively, had a considerable bearing. One subscriber for five shares frankly declared that he subscribed because of his "confidence in the present management under Messrs. Kidd and Murrin."

One of the first steps in the campaign was the publication of a comprehensive special number of The B.C. Electric Employees' Magazine, replete with halftones of company property and with charts showing the rapid expansion of the company's services. This booklet also was published for public consumption under the title of "Twenty-nine Years of Public Service." By means of a coupon printed in "The Buzzer," the company's publication in the street cars, 2,500 requests for this booklet were received from the public.

In preparing for the campaign the committee decided to keep strictly to organization lines, working only through department heads. Each employee was asked to submit ten prospects to whom would be mailed a folder. A sales manual was printed and every possible assistance given to the employees who had never sold a share of stock in their lives before. Speakers' classes were arranged so that fully trained speakers might be sent to outlying points to address employees on how they might sell shares and make commissions.

Of the $2,250,000 offered, local bond dealers underwrote $1,500,000 and employees were allotted the remaining $750,000 to buy for themselves or sell to the public. For various reasons the company did not wish to put an issue on the market without giving bond dealers an opportunity to participate. The latter had explained that there was not another good local stock available in any quantity.

This double selling campaign made it necessary to hold back all advertising until the date set for release, namely: March 19. With the clearing up of all legal entanglements, it was impossible to prevent bond dealers and those employees who were "in the know" from talking about the stock even if application forms were not available. Besides, the business community was agog with talk about the impending issue. Consequently the date of the campaign was pushed ahead to March 15, in spite of the fact that folders, advertising and even the distribution of application forms could not be completed by that date.

The first day's sales, therefore, were accomplished without the aid of any advertising whatever and on that day practically the entire employees' allotment was sold. It was only by the third day that the advertising began to be felt and on that day applications were brought in by employees for $1,400,000. Employees had been assured that they would be allowed sufficient time to get to their prospects and for this reason the sale could not be closed for five and a half days. In that time applications were brought in totaling $5,655,300, exclusive of the brokers' amount of $1,500,000, which was sold in the first two days.

At the close of the campaign the company found itself with $2,155,300 in applications that it could not fill and yet dozens of applications were received after the closing data and thus not recorded. During the day or two before the close it was the common experience of all employees to have friends call up and beg them to move heaven and earth to have their applications filed in time.

The carefully planned campaign for the most part was forgotten. Employees who had not thought of exerting themselves to sell stock found that it was so easy they could not help sending in applications. Altogether out of a permanent payroll of 3,000 no less than 1,500 employees earned commissions. Then 1,270 employees themselves purchased shares. Employees on the street cars, in the gas plants, line departments, union employees as well as office employees—every branch of the company's services participated in the campaign.

It was found necessary to issue the entire $5,000,000 of shares authorized but as applications for a total of $7,155,300 had been received many had to be cut down drastically. The limit had been placed at 50 shares but no one applying through employees received more than 10 shares.

Of the reasons for the success of the campaign there is considerable to be said. The shares were 6 per cent cumulative preference, dividends being guaranteed by the parent company. This guarantee placed them next to the parent company's bonds and, after the payment of the interest on these bonds, the company last year had $1,860,000 available for dividends on stock ranking after this issue. In other words, taking the amount offered, namely $2,250,000, the company had available earnings sufficient to pay dividends fourteen times over. It is doubtful, however, if the majority of applicants thought about these figures. The company never has made a practice of publishing its financial figures. The response therefore was an indication of the sublime faith of the public in the financial stability of the company.

Next in order as a reason for the success of the campaign must come the ease with which the public

GAS
Servant of Man
Carrying 71,796,794
Essential Services
Electric Service -a basic need
British Columbia Electric Railway
~devoted to the progress and development of British Columbia
4 DIVIDEND CHECKS every year
January April July October 1
B.C. Electric POWER & GAS CO.
6% Cumulative Preference Shares
Ask any B. C. Electric Employee
APPLY HERE FOR
B.C. Electric Power & Gas Co.
6% CUMULATIVE PREFERENCE SHARES
Only $10 Down per Share
Any B. C. Electric Employee or Office will take your order
Would you like an Extra Pay Cheque every 3 months?
READ The Buzzer NEXT WEEK
In Cars Friday, March 19
The Conductor on this car ... can take your application for B. C. Electric Power & Gas 6% Cumulative Preference Shares
How You Can Share in B. C. Electric Earnings
SEE THIS WEEK'S BUZZER
In Cars Friday, March 19
Have an extra pay check every 3 months
Buy B.C. Electric 6% Cumulative Preference Shares
"Ask any B. C. Electric Employee"
Save and invest at home in B.C. Electric 6% Cumulative Preference Shares
$10 down and 9 monthly payments
"Ask any B. C. Electric Employee"
PUBLIC UTILITIES
Supply necessary services which are indispensable to the everyday life of modern communities
B.C. ELECTRIC RAILWAY
B. C. Electric Payroll now exceeds $5,000,000 a year
In 1925 the B. C. Electric generated 390,000,000 kilowatt hours of electricity
Electric Power Companies
GAS —also an essential utility
Gas Service has been supplied in Vancouver for 40 years!
In 1925 the B. C. Electric manufactured 837,774,700 Cubic Feet of Gas
Gas Service is an essential modern convenience
B. C. Electric Ry. has been continuously "At Your Service" since 1897
Electricity — Gas and Transportation
B. C. Electric Light and Power Customers: 1915 - 53,738 1925 - 87,400
A Progressive Company in a Progressive Province
In 1925 the B. C. Electric carried 71,152,985 passengers
People MUST have Transportation Service

Samples of advertising used before and during the customer-ownership campaign. Across the top are typical newspaper ads; the balance are car cards.

could subscribe. Many persons with no knowledge og bond dealers or stock brokers are at a loss to know how to invest. On the other hand, there were 3,000 employees of the British Columbia Electric Railway Company, distributed throughout 350,000 people. There were a score of offices at which people were in the habit of paying their light and gas bills. Further than that, they were in daily contact with the company, in its street cars especially. This combination of familiarity with the company and ease of purchase was a most effective one. It is safe to say there was hardly a person who did not know personally one or more employees of the company, and many people once they knew about the shares called up their employee friends and gave them the order.

The British Columbia Electric Power and Gas Company now has about 11,500 customer-owners, which is more than 13 per cent of its total light and power customers. Of the 10,245 applications received by employees, 8,049 were for five shares or less and 3,156 for only one one share each. More than 40 per cent of the permanent employees now own shares.

First Aid—How?

By W. E. Richmond
San Diego Consolidated Gas & Electric Company

TO accomplish effective first-aid instruction requires constant and painstaking patience, even though effort is required no longer to "sell" safety-first ideas. Whenever and wherever safety measures and first-aid instructions have been adopted their value is so palpably apparent from any and every point of view as to be beyond question.

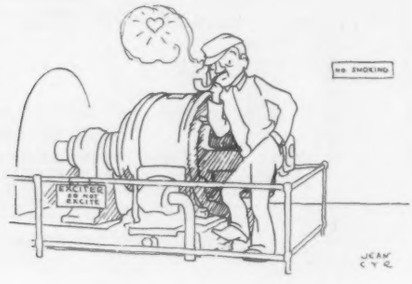
Organized efforts to reduce accidents, eliminate hazards to life and properly to instruct employees in rendering first aid to the injured now are recognized as a part of our national industrial life.

Show 'em—Don't Tell 'em

Now, the above statements possess the smug, well-satisfied, oily smoothness of flowing sound which falls so gently upon the ear of the person that prefers only to hear praises sung when anything is said concerning the conduct of his business. Tell some people that their "organized efforts" along any certain line are not worth the powder to blow them anywhere but to certain failure and you at once become popular with yourself—and nobody else.

The moral is, then, "Don't tell 'em." Get in and dig, and let them learn to know you by your works.

"Self-protection is the first law of nature." Sounds good, but if you believe it you never have got right



". . . . the trance they like to call work."

down among working men and watched them "protect themselves" while moving about in the trance they like to call work. The very fact that there is a real necessity for first-aid and safety-first work is positive proof, prima facie evidence, and all the rest of it that the greatest necessity of everyone of us human beings is protection, and that principally from ourselves!

There is real need for first-aid instruction which will get over to the men what **not** to do as well as what **to** do in case of accident.

The other day a lineman ran a hook through his cheek, making a gash an inch and a half long, severing a small artery and in general making a nasty wound. The foreman, who of all the crew should have known better, put some spirits of ammonia in water then washed the wound with that mixture! One of the first principles of first aid is "Do not wash wounds with **any** liquid if the patient can be

"Teach every employee all that you can get him or her to absorb about HOW to render PROPER first aid."

taken at once to a doctor, or a doctor to the patient" except under very extraordinary circumstances. As this patient was in the doctor's hands within twenty minutes, the proper thing would have been simply to cover the wound with a sterilized bandage, of which there were plenty in the first aid kit.

How can we get and hold a 50-per-cent interest of every employee in his own safety while about his everyday job? What is the best method?

Teach every employee all you can get him or her to absorb about how to render **proper** first aid to the injured. This is the best preventive of accident, too, from a purely educative point of view. The only other way to prevent accident is to do no work of any kind which will jeopardize safety! Of course that would indicate that we had better go ahead and educate each other to work safely.

All right, let's go. Going to teach everybody how to give the right kind of first aid. What is the right kind? How can we recognize it when taught us?

The kind of first aid that everybody should know is "proper emergency first aid." What is its function? To prevent further infection by sterilizing the wound; then to protect it with sterile coverings.

Proper instruction informs the student how to do this in the best possible manner **only** up to the point where the patient is contacted with the doctor; that is, under the circumstances immediately surrounding the accident.

Initial Steps

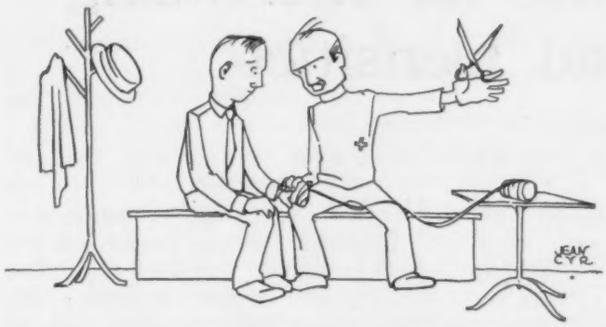
We will assume that the management selects a man and tells him to teach every employee how to render proper first aid. No strings, purse or otherwise; absolutely free rein to put it over. Assume virgin soil to work in, nothing to be torn down or remodeled, the only difficulties within immediate sight being the checking-up on the existing condition of legal safeguards already installed and the condition of first-aid kits and their contents, if any, on hand.

The instructor selects a location central in relation to his field of activity, gets together what he knows is necessary and desirable in the way of thoroughly equipped office and first-aid room and is given the use of an assembly room for a classroom. Letters are written and bulletins posted. The employees are informed that immediate first aid is available; that without cost they may receive instruction and training and learn why and how it all is done.

Incidentally, each patient as he comes in is given, in a conversational way, instruction in accident prevention and in proper first-aid measures to use after an accident. These chances for a little "education" are too good to be passed over.

The instructor continually becomes better acquainted with the men, their habits of thought, ability to absorb and use knowledge, their family affairs and home life, their racial characteristics and how all these affect their work. They come to him with their troubles and with their joys, and this contact results in mutual education.

We now will consider "Doc" to be well established in his routine work, possessed of the confidence of



". . . . each patient as he comes in is given, in a conversational way, instruction in accident prevention and in proper first-aid measures. . . . . These chances for a little education are too good to be passel over."

his fellow-employees and able to put over anything reasonable and good for them. For some time he has been instructing the various crews in the use of the contents of the first-aid kits and in what to do with nothing at all when the emergency arises.

Difficulties

He has studied the hazards to which the various types of employees are exposed, and his instructions cover these hazards as well as first aid of a general nature. Right here are encountered his first difficulties requiring any special effort to overcome. The men are instructed on company time. Their superintendents, with all the good intentions in the world, find it difficult to spare the services of a whole crew for even an hour's instruction. It takes considerable diplomacy and tact to ask the same superintendent a number of times for a class! Yet, taking each crew in rotation as they can be had, it takes a long time to get around with the

"They forget the hour of the class; . . . . Gosh! If there's any kind of an excuse they can't think up—well, I have yet to hear it."

first lesson. The second and third overlap and meanwhile the number of employees grows and it becomes desirable to have more instructors.

To fill this need a number of men are selected, or volunteer, for special instruction as instructors. They are taught in hourly lessons on company time twice each week. More difficulties now have to be overcome, principally in getting an attendance of those chosen for this special instruction. They forget the hour of the class; they consider their own work more important than class work; they are afraid they will be noticed by their boss as neglecting their work for the class work. Gosh! If there is any kind of an excuse they can't think up—well, I have yet to hear it. When you do get them corraled, however, their interest is keen. They sincerely like the work, and they go after it and become of real use to the organization.

"Home Remedies"

In the teaching of safety and accident prevention practices it is not unusual to meet some opposition which has to be overcome. There is a phase of first-aid instruction analogous to that situation in safety work, which is—the chap that is wedded to his use of "home remedies." Because a chew of tobacco clapped on an open wound once worked successfully, or rather no harm resulted from it, he thinks there is nothing so good as a chew of tobacco. Same with a piece of bacon rind, a flaxseed poultice or a red woolen rag.

Every once in a while someone forgets to take the bottle of his favorite patent medicine out of the first-aid kit he brings in to be replenished or repainted and thus lets the cat out of the bag. Yes, there are many "pointers" indicating the need of education as to what is and what is not of real value as a remedial agent for use for first-aid purposes that will not interfere with the measures the

doctor will use when he gets on the case. You can educate, and educate, and you can't always seem to make it stick, but you can keep trying!

On the face of things it would appear that it only would be necessary to order Tom, Dick and Harry to attend classes. In actual practice, however, it does not work out in just that way.

The foregoing remarks are not intended to be discouraging, but just an indication that all is not a bed of roses in this first-aid vocation any more than in any other. This sort of educational work has a wonderfully bright side, and that is seen

"The chap that is wedded to his home remedies. . . . ."

every time a snappy safety-first and first-aid demonstration is put on for the public by some of the competing teams at the meets which occur more and more frequently. The work put on by these teams is finer even than it need be, but it can't help being so, it is bound to work out that way. Practice, practice, practice, is going to result in accomplishing pretty work in any line. Back of all the exhibition stunts and the perfect drill of these teams, you may be mighty sure, stand many years of good hard pounding away at the details of the

"You can educate, and educate, and you can't always seem to make it stick, but you CAN keep trying."

work which produces such fine spectacles. So the management must be very patient as it stands by and watches the growth of any "organized" effort to help men help themselves.

Experience has hearteningly taught that once the men are given a chance they will learn all you give them to study, even work nights at it. Every now and then one of them comes around and says, "Well, Doc, you have given me such a start that I guess I will study to be a doctor," and, sure enough, some of them do that very thing. First aid and accident prevention work pays **well.**

Editor's Note—Discussions of the foregoing dissertation will be welcomed by the author. Not only discussions but remarks lengthy or otherwise either in support of, in amplification of or contrary to Mr. Richmond's opinions and suggestions will add to the possible value of the paper and expand the efficacy of first-aid work. Communications may be forwarded either to the Editor, Journal of Electricity, or to Mr. Richmond.

Distribution Facilities for Increasing Domestic Load Densities

By M. T. Crawford*

Superintendent of Distribution, Puget Sound Power & Light Company, Seattle

RAPID increase in the use of the electric range and electric water heater during the past few years has transformed the load of the residence which formerly required a few hundred watts to an individual load of around 8 kw. or more. Distribution systems, generally, have been able to take on satisfactorily a reasonable amount of this load, but in localities where ranges are being connected by the thousands it has been necessary to consider radical changes in distribution practice to meet economically the new conditions. The plans devised by the Puget Sound Power & Light Company to meet these new problems in residential distribution may be of interest.

Among the principal factors which determine the design of any distribution system are the characteristics and requirements of the load and the load density per unit of area. The necessary requirements having been met, maximum economy is always essential. Residence service requires a reasonable high service continuity and good regulation. Voltage regulation has been planned to come within a normal maximum range, approximately two per cent each way from the lamp standard of 120 volts.

Load density is a variable factor which normally increases. Starting with a newly opened suburban addition with only a few houses to the block, very light load densities are obtained at first; but these increase during a development period up to the time when all lots are improved. Then may follow a partial apartment-house period, when conditions are favorable, with even greater load density. The distribution system under discussion is designed for conditions between these limits and does not consider rural lines or solidly built apartment, hotel or commercial areas.

In designing the system certain conditions were

* Abstracted from a paper before the Fall, 1925, Pacific Coast Meeting of the A.I.E.E.

laid down. The diversified feeder demand was estimated to average 500 watts per residence having only lights and small appliances, 1,250 watts per residence having a range also, and 1,600 watts per residence having a range and water heater. An average city block was taken to be 0.004 sq. mile, which will include from 16 to 20 fair-sized lots and the necessary street area. An average maximum load density was set at 25 kw. per block of 17 houses, estimating five homes with range and water heater, eight with range alone and four with lights

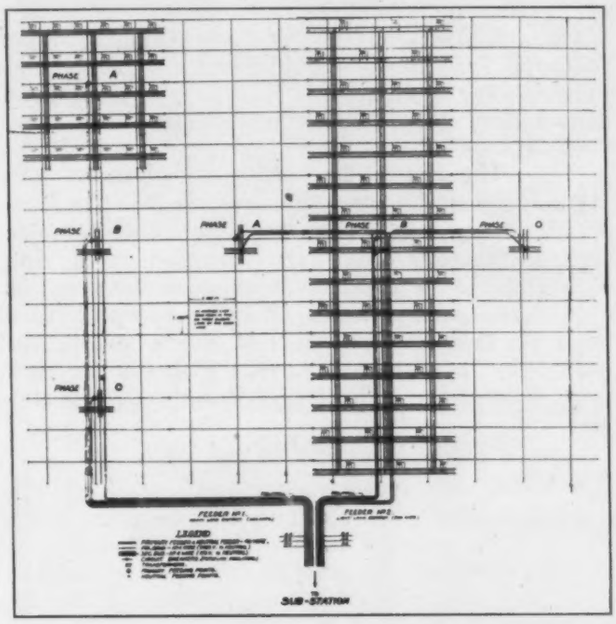


Fig. 1. Diagrammatic outline showing principles employed in overhead distribution system for residential area with complete development in upper left-hand corner on phase A of feeder No. 1.

and appliances only, plus a 30-range apartment house every six blocks. On this basis the load density would be 6,250 kw. per sq. mile.

It was planned to construct a distribution system which, without reconstruction, could be added to as the load density increased. The lines are so laid out that at first when the load density is light only a portion need be built. The plan was to cover the entire residential area with a grid form of service network of uniform conductor size, irrespective of load density. Increases in load density then can be taken care of by running out additional feeder capacity and tapping this grid at more frequent intervals.

A nominal primary distribution voltage of 4,500/2,600 volts, four-wire, three-phase, star-grounded, was employed, supplying single-phase service by means of three-phase feeders which are balanced as nearly as practicable by dividing the service area into three uniform load sections for each feeder.

The secondary bus or street mains consist of three No. 4 wires of uniform size at all points, operated on a single-phase Edison, three-wire basis with neutral grounded. Where practicable the bus is built longitudinally along the streets or alleys and at intervals of approximately every two blocks, or about 800 ft., cross ties are installed over cross streets between the longitudinal runs. By this means a solid grid network is constructed. For the ultimate load density a maximum size of five by six or thirty blocks is standard. Insulating circuit breakers are placed in the bus around the edge of this grid to separate it from adjoining net works except that no circuit breakers are placed in the neutral conductors.

A single-phase, primary grid of one No. 4, weatherproof wire is installed parallel to the secondary bus as to both location and area. Standard 10:1 transformers are installed between the primary and secondary grids at such locations as the load demands up to an average of one 25-kw. unit in the middle of each block. The secondary bus neutral is used also as a primary return from the grounded side of the transformer to the feeding point in the center of the grid.

For load densities at present anticipated, primary feeders from the substation are of standard size No. 4/0 copper. Four wires are taken out for a three-phase feeder and three 30-block areas supplied therefrom, chosen as far as possible so as to be of average uniform distance from the substation. When the three-phase primary feeder reaches a central point in this load area, each of the three-phase wires branch off and tap into the center of the No. 4 primary grid, covering one of the 30-block areas.

Branches from the neutral feeder follow each single-phase primary branch and tap the neutral grid at the same point where the primary grid is tapped. Additional taps may be made from the neutral feeder wire to various points in the neutral grid when necessary as determined by neutral current tests. These are made periodically and at the same time the transformer loads are measured. Not less than one No. 4/0 neutral is installed along the route of each feeder from the substation to all feeding points but where several feeders take the same route one neutral conductor only may be installed for their combined use.

The accompanying diagram shows the plan in outline. For the average block size and uniform load distribution careful calculations were made of network currents and voltage gradients to check the wire and equipment sizes and spacings adopted as standard.

In actual practice block sizes and shapes vary considerably, and load densities vary from block to block, but these conditions are met successfully by adjusting the size and location of transformers.

The above design is for the presently anticipated ultimate load density where a 300-amp. feeder will be loaded in a 30-block area. Starting with very light load densities, feeders may be operated at 200 amp. and one feeder may be used to supply a much larger area. Three of the 30-block areas referred to, which are ultimately to be used to load the three phases of a 3-phase feeder, are combined into one 90-block area and the circuit breakers omitted from the primary and secondary grids so as to make a one-grid network over the entire area. The single-

phase No. 4/0 branch feeders, ultimately to supply separate grids of smaller extent, are spliced together and taken to the station as one single-phase feeder. In extremely light load densities two 90-block areas are served by one No. 4/0 single-phase feeder, but their primary and secondary grids are kept separated by circuit breakers. A 90-block area is considered a maximum which it is good practice to operate on one secondary grid for reason of service continuity.

This system has been in successful operation for the past few years, replacing a 2-phase,4-wire distribution network. Briefly summarized, its advantages may be said to be construction economy under conditions of light load density at first, followed by rapid growth in more or less unforeseen localities, and ability to meet the more exacting requirements of voltage regulation and service reliability demanded by increased domestic use.

County Fair Home-Lighting Exhibit

By J. P. Fairbank
Extension Specialist in Agricultural Engineering, College of Agriculture, University of California.

FARM lighting was given more space than any other exhibit at the last San Diego County Farm Bureau fair, held at Balboa Park, San Diego.

During the past year the Agricultural Extension Service of the University of California has done considerable work on the better lighting of farm homes in San Diego County. Each year previously the county farm advisor and the home demonstration agent put on an exhibit at the county fair showing but one or two phases of the varied activities done in and by the rural communities of San Diego County. For last year's fair, however, cooperation was given by the San Diego Electric Club through the loan of equipment by its dealer members.

Full-Sized Rooms

Three full-sized rooms were built, wired and lighted. A kitchen 9 x 14 was shown complete with an electric range, sink and work table. It was lighted by two brackets and a kitchen unit. This room merely demonstrated a well lighted and conveniently arranged kitchen.

Two living rooms, each 14 x 14, were identical except as to lighting and wall and ceiling colors. The first, a "horrible example," was finished in brown and was lighted with an old-time chandelier having four crystal globes with a 60-watt lamp in each. This fixture not only failed to light the room well but also caused glare, to say nothing of its appearance.

The other living room was finished in tints of light buff and cream. Here the lighting equipment included brackets with ivory-tinted lamps, a portable table and a bridge lamp, and a ceiling unit composed of a 100-watt lamp in an enclosing globe having neatly etched decoration.

When all the lights were on each room was using 240 watts, and the contrast was apparent to the most casual observer. To bring out the contrast further the room circuits were switched on and off by a motor flasher, lighting each room alternately at 5-second intervals. The public did not enter the rooms but viewed them from the aisles.

Women members of the Home Department of the County Farm Bureau were in attendance and ably answered questions and discussed features of the exhibits with all who were interested. The five lighting outlets in the well lighted living room gave an excellent opportunity to demonstrate the effects to be obtained from different combinations of lighting equipment.

The attendants and the placards emphasized the following four simple requirements for farm home lighting: (1) Enough light. (2) No glare. (3) Good distribution. (4) Pleasing appearance.

The Reflection Values of Colors

Other smaller display sets were arranged to show details of home lighting. To show color reflection five miniature rooms were arranged in a row, each finished in a different color or combination of wall and ceiling colors. Each room was lighted by a G. 18½ 25-watt all-frost lamp held in the ceiling by a sign receptacle. Placards in each room showed the reflection efficiency of its particular tint.

Comparison of Lighting Units

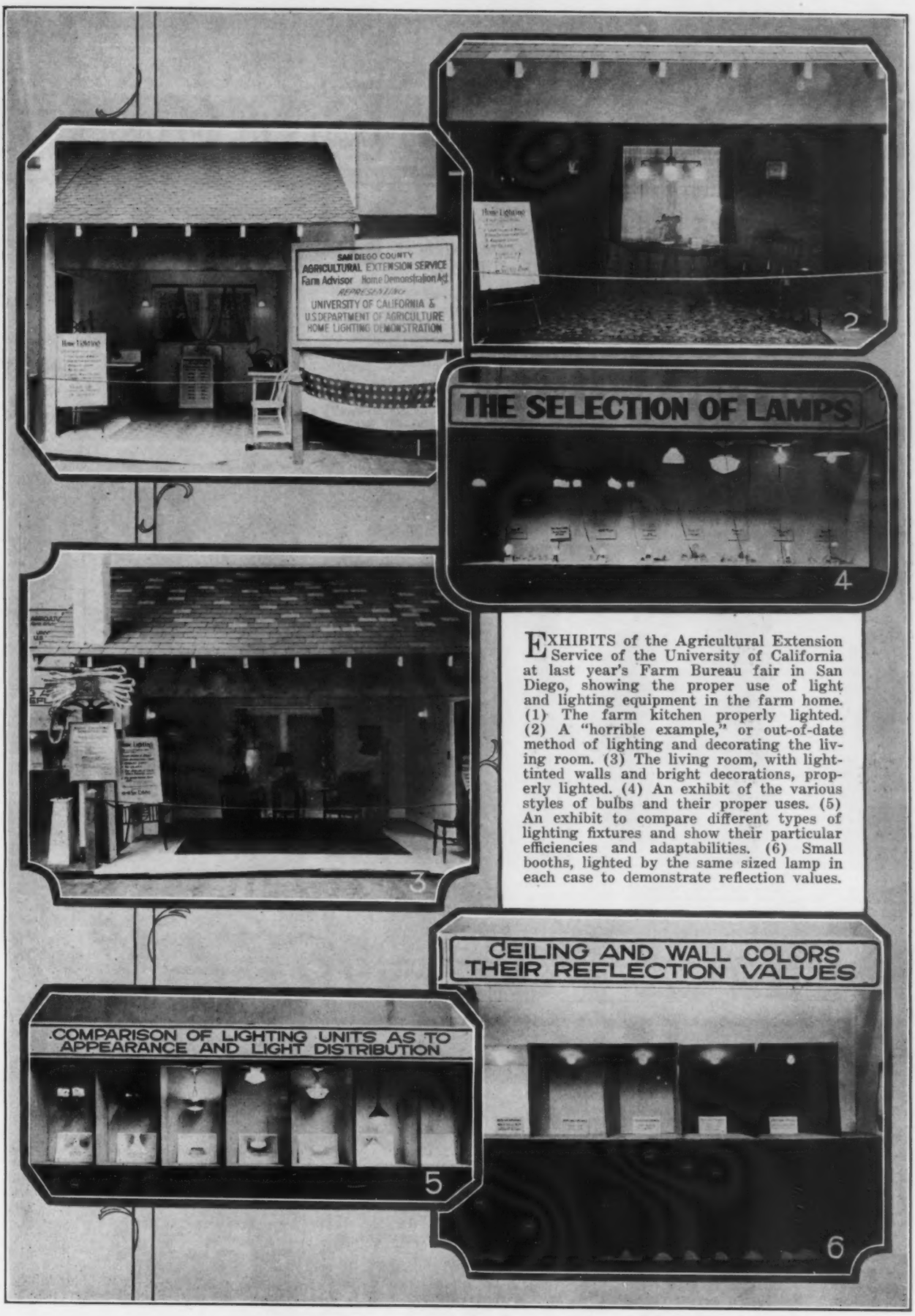
A booth with seven compartments, each 2½ ft. wide, 2 ft. deep, with a ceiling 7 ft. from the floor, was used to compare units as to light distribution and appearance. All compartments were finished in a gray, and placards in each indicated the approximate distribution of the light as given by the unit suspended above it. As more than seven types are in common use, these units were readily removable so that others could be substituted in a few seconds.

The Selection of Lamps

To illustrate the point that the right lamp is the first step in obtaining good lighting, a display was made of eight different types of lamps and the class of units in which the lamp could be used to advantage.

In addition to these a series of colored charts was made by the home demonstration office showing good and bad types of reading lamps and the effect of their position in relation to the eyes and the book.

Over 1,000 sq. ft. of floor space was given over to the lighting display and more than a week's time devoted to its installation. Some 30,000 people attended the fair, not all of whom saw this exhibit, to be sure. Nevertheless, an appreciation of better lighting was, we think, taken away by a lot of folks, both of urban as well as rural residence. Furthermore, it showed many business and city people that the Farm Bureau and the Agricultural Extension Service is not only interested in developing better crops and herds but also in creating better homes and living conditions in the "back country" where live the city folks' friends, customers, clients and fellow taxpayers.



EXHIBITS of the Agricultural Extension Service of the University of California at last year's Farm Bureau fair in San Diego, showing the proper use of light and lighting equipment in the farm home. (1) The farm kitchen properly lighted. (2) A "horrible example," or out-of-date method of lighting and decorating the living room. (3) The living room, with light-tinted walls and bright decorations, properly lighted. (4) An exhibit of the various styles of bulbs and their proper uses. (5) An exhibit to compare different types of lighting fixtures and show their particular efficiencies and adaptabilities. (6) Small booths, lighted by the same sized lamp in each case to demonstrate reflection values.

CENTRAL STATION CONSTRUCTION OPERATION AND MAINTENANCE

X-Ray Used to Locate Faults in Submarine Cable

Definite Visual Inspection of Cable Joints Possible with this Novel Method; Cost Only Limitation

By F. E. DE SILVIA, General Foreman Underground Lines, Puget Sound Power & Light Company, Seattle

The need for some adequate means of finding defects in the insulation of submarine cable was brought forcibly to attention through the operation of a 6.6-kv. cable across a portion of Puget Sound from Seattle to Vashon Island. A series of failures occurred in this cable. After each of these the cable was tested out and the point of breakdown repaired by cutting out a section containing the defect and splicing the ends together. After a time the failures became so frequent that a new 13-kv. cable was laid and the old cable was taken up for more complete repairs.

Although some of the failures had occurred at points where splices had been made in former repairs a number had occurred at factory splices and still others at points where defects in the original insulation existed. These defects took the form of gas and air pockets in the insulation, of non-adhesion of the rubber to the conductor and, in the case of some factory splices, of an imperfect brazing job on the copper in which small nubbins were left, permitting the deleterious effect of corona action.

The difficulties in obtaining a perfectly insulated splice in any ordinary cable used in underground work were well known. For instance, it was known that decentralization of the conductor within the insulation occurred when during the vulcanizing process the tension on the copper, expanding under heat, caused it to move through the soft mass of rubber so that upon cooling it would be off center. Also it was known that in some instances, due to lack of uniformity of pressure and temperature, gas and air pockets formed in the insulation. The great difficulty in connection with such faults was not so much that they existed as that a visual examination of the completed job would not disclose their existence. The common practice of introducing into the vulcanizing bath a test splice and of later cutting open this splice to see if the job was all right was only partly effective, since occasionally faults would creep into the service splice that would not occur in the test splice. The only indication of this would come later when the service splice failed in service.

The idea that an X-ray might be applied to the inspection of cable splices came when the writer had an X-ray examination of himself. After some experimentation with a small portable X-ray machine, such as is carried around by physicians for use in the homes of patients, a faint shadow of the conductor through the insulation was obtained upon a fluorescent screen. This was secured by using 40 kv. at 5½ milliamps. Further experiments then were made on a large machine until finally, using 140 kv. at 7 milliamps. with a 7-in. spark, a distinct impression of the cable was produced on the screen. In this impression a narrow, dense, nearly black line between wider lines of less density and of lighter shade represented the copper conductor inside the rubber insulation. Any irregularity in the insulation was immediately apparent; gas and air pockets showed up as lighter spots within the darker areas. After reaching a stage in the experimentation at which reasonably clear results were being produced photographs were taken with the idea of studying the nature of the different kinds of defects.

Figure 1 shows decentralization in a splice made in the field. This is perfectly obvious at a glance and needs no further explanation except to say that from outward appearances it never could be detected. Such a splice would be returned to service and only after a failure at this point would it be known that the splice had been faulty.

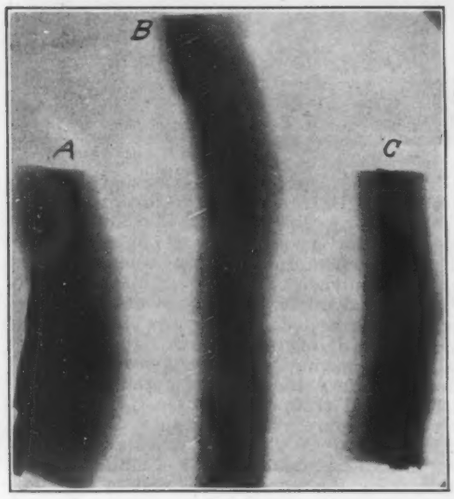


Fig. 1. Showing decentralization of conductor in field splice, the outward appearance of which was normal.

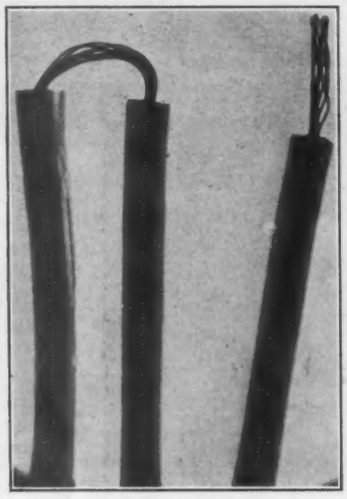


Fig. 2. Showing piece of cable as originally received from factory. Light grey spot is air pocket; darker spot is gas pocket.

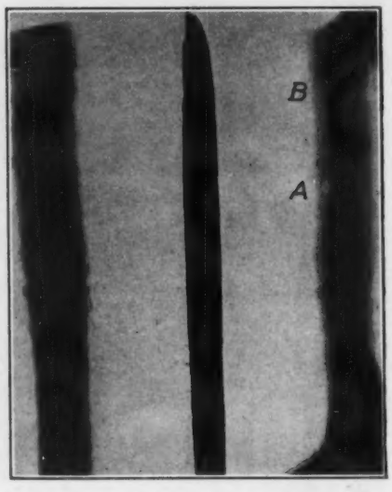


Fig. 3. Disclosing a large gas pocket (A) in original cable insulation and large nubbins on conductor (B) permitting corona.

Figure 2 shows a piece of cable as it came originally from the factory. The light grey spot is an air pocket and the slightly darker spot is a gas pocket. This was proved later by puncturing the insulation at these points with a needle attached to a vacuum test tube and analyzing the gases drawn off. From the places where the lighter shadings showed a pocket the gases were mainly oxygen and nitrogen, or practically an air mixture. Lead and copper sulphate were found in the pockets marked by the darker shadings. The point to be emphasized in connection with these defects is that they existed in the cable as originally shipped from the factory and only through a later failure would their presence normally be known, and

then of course at the expense of a costly service interruption.

Figure 3 discloses a large gas pocket (a) in the original cable insulation, and (b) a defect in the conductor (b) where large copper nubbins are plainly visible, allowing corona action to take serious effect. In the left cable in this picture is seen a thin air space next to the conductor indicating non-adhesion of the rubber due to faulty vulcanizing. In this space ionization through corona action will take place, eventually causing a failure.

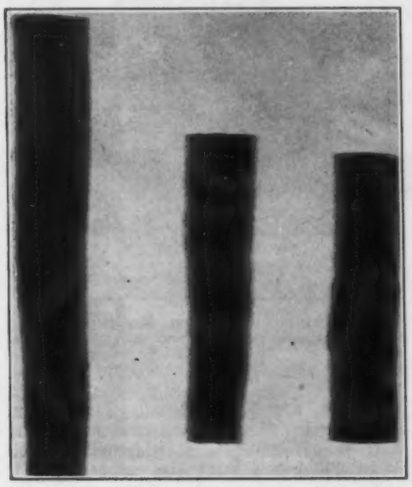


Fig. 4. Showing opposite ends of a factory splice, illustrating poor adhesion of insulation and nubbins on conductor due to poor brazing.

Figure 4 shows opposite ends of a factory splice, again illustrating non-adhesion of the insulation and copper nubbins left on the conductor by imperfect brazing.

Having seen the kind of inspection that is possible by the use of the X-ray, the next question is, how can the process be used in actual practice. A number of possible uses at once will suggest themselves, but of course the practicality of them will be determined in the main by the cost. While this cost may prohibit the use of the process in ordinary routine underground work it seems probable that, due to the extreme importance of splices in submarine cable, this company will find it economical to use it on all important splices in such cable both when it is being laid originally and later in maintenance work.

Another possible use for X-ray inspection is at the factories of cable manufacturers. Where conditions seem to justify the cost the cable, after its insulation is vulcanized, could be drawn slowly through the X-ray so that its impression would be projected upon a fluorescent screen. An inspector then readily could detect flaws which could be cut out, enabling a practically perfect cable to be sent out from the factory.

Still other possibilities are apparent. The method could be applied perhaps to inspecting insulators and other equipment relying for its efficiency upon the density and uniformity of the insulating substance. Further, it might be applied to finding the causes of transformer or oil-switch failure before tearing down the apparatus, a procedure which frequently obliterates the cause before it is found. Only the more obvious applications have been suggested, but before any use is attempted it would be prudent to study into the cost and to determine the justification of such cost. Possible development in the X-ray machines themselves, through which they may be better adapted to the particular problems involved, may assist in making their use practical for the many problems of the operating company and manufacturer.

New 60-kv. Tie Line Presents Interesting Features

By C. B. CARLSON, Structural Designing Engineer, Southern California Edison Company, Los Angeles

To tie together two important parts of the 60-kv. transmission system the Southern California Edison Company found it necessary to traverse some rough country. The line replaces an older line built on wood poles and obviates the hazards of brush and grass fires. Starting at the Saugus substation on the Kern River No. 1 transmission line, the new line bears in a southwesterly direction across the Santa Susana Mountains to the head of the Simi Valley. Saugus is an important switching point on the Kern lines and is immediately adjacent to both the Big Creek 220-kv. lines. Thus the Simi Valley district in effect is brought closer to a major power supply than as fed previously from a smaller substation a few miles farther south and also on the Kern lines.

The new line from Saugus was designed for a normal operating voltage of 110 kv., although at present it is insulated and energized only to 60 kv. Consideration first was given to the possibility of using steel poles and triangular configuration in the line.

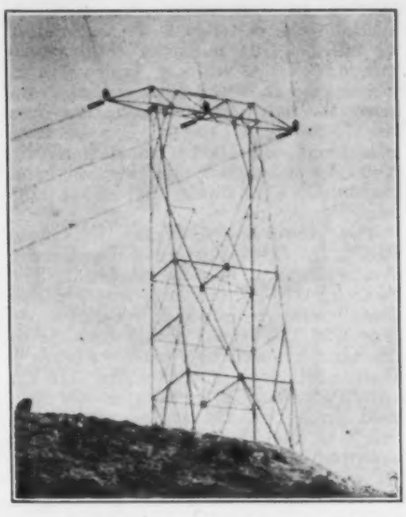


Fig. 1. Angle tower, 58-deg. angle.

However, studies and designs brought out the fact that with but a very small additional structure weight a tower could be provided. Stringing the line on flat-type towers permitted the following highly desirable conditions:

1. Horizontal configuration.
2. Conductor separation of 13 ft. horizontally.
3. Narrow tower base, facilitating the obtaining of the right-of-way.
4. Angle and anchor structures self-supporting, thereby avoiding difficulties of guyed structures.

Earth footings were used for all of the towers. The standard suspension towers have a 2-angled footing, allowing thereby a resistance not obtained by the ordinary single-angle anchor. Angle and anchor towers are fitted with tripod footings having sufficient base angle area to develop bearing and to furnish uplift resistance. The maximum horizontal angle in the line is 58 deg. This angle was made on a single tower and without guying as indicated in Fig. 1.

Framing details are shown in Figs.

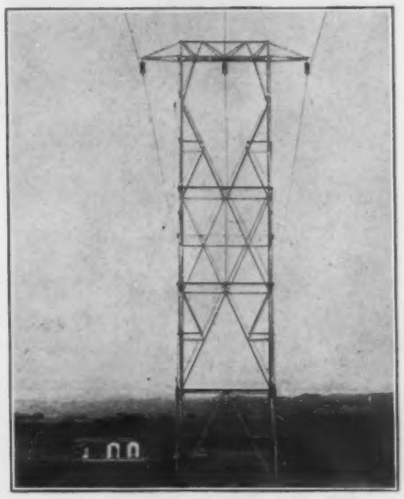


Fig. 2. Standard suspension tower with 14-ft. level extension.

2 and 3. It may be noted that the scheme of framing used permits almost a direct-line transmission of stress down into the footings. Standard and anchor towers measure 52 ft. to the crossarm, without extensions. The towers were designed on the basis of the use of high-elastic-limit steel galvanized by the hot-dip process. The security of all bolted connections was insured by the use of spring washers under the nuts. Tower weights are as follows:

Standard tower without footings	3,000 lb.
Standard tower footings	544 lb.
Anchor angle tower without footing	4,040 lb.
Anchor angle tower footings	912 lb.

Various types of side-hill and level extensions were used to advantage in adapting standard towers to conditions imposed by the profile of the territory traversed. Two transpositions were made in the line using the type of transposition tower shown in Fig. 4. Two towers and three spans effect a complete transposition. Close scrutiny of the illustrations will show the bird guards installed in strategic locations over each conductor. These guards are made of saw-toothed strips of galvanized sheet metal and fastened to the towers where the close proximity of a bird to the conductor would constitute a hazard. This type of bird guard affords an exceedingly uncomfortable resting place for birds and has proved successful in several applications.

Normal spans are 750 ft. and stress the 4/0, stranded-copper conductor to 17,000 lb. per sq. in. Three cases of spans over 2,000 ft. were encountered, the longest being 2,341 ft. There are 68 structures in 13 miles of line, mak-

ing an average span length of 1,000 ft. over the whole line. Actual stringing values varied from 17,000 to 20,000 lb. per sq. in. at maximum condition which was figured for 25 deg. F. with ½ in.

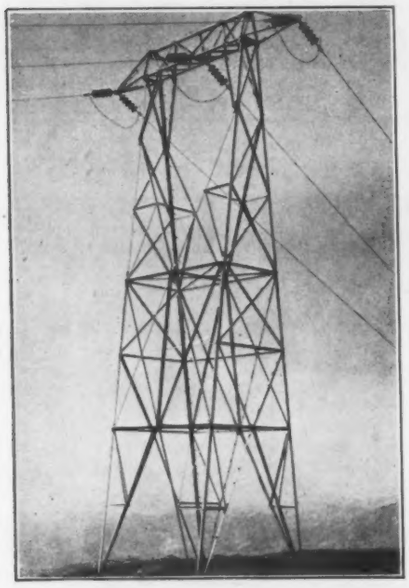


Fig. 3. Close-up of anchor tower showing bird guards in place.

on ice and a wind load of 6 lb. The sagging was done in pulls of approximately 1 mile, with the aid of a transit.

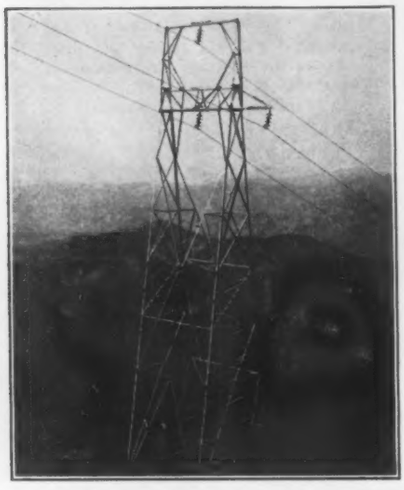


Fig. 4. Transposition tower. Background shows nature of country traversed.

The line was erected by the company's construction department, and the design and the sagging of the cables were done by the company's engineering department.

Seven distribution substations of the San Antonio (Texas) Public Service Company are to be outfitted with complete supervisory control, according to the Westinghouse Electric & Manufacturing Company. The supervisory control is to care for the high-tension loop breakers as well as the low-tension distribution feeder equipment. Provision for future installation of remote load-indicating devices also is to be made.

Shasta Substation Provides Interstate Tie

By E. A. CRELLIN, Assistant Engineer, Division of Hydroelectric and Transmission Engineering, Pacific Gas and Electric Company, San Francisco

The latest addition to the 220-kv. substations of the Pacific Gas and Electric Company is known as Shasta substation. It is located about two miles from Cottonwood, in Shasta County Calif., at the point on the Pit-Vaca 220-kv. transmission lines where the construction changes from two single-circuit tower lines with conductors in a horizontal plane to double-circuit towers with conductors in a vertical plane. The function of this station is to receive power purchased from the California Oregon Power Company and to raise the voltage to 220-kv. for transmission to Vaca-Dixon substation over the Pit-Vaca lines.

Power from the California Oregon Power Company's Copco No. 2 plant is received over a 110-kv. single-circuit transmission line approximately 120 miles in length, carried on wood-pole structures. The 78 miles from Copco No. 2 to Delta, Calif., was built and is owned by the California Oregon Power Company. The balance of the line from Delta to Shasta substation was constructed by and is the property of the Pacific Gas and Electric Company.

It is intresting to note the distance this power is transmitted from its point of generation at Copco No. 2 to the load centers at Oakland and San Francisco. As noted above, the distance from Copco No. 2 to Shasta substation is approximately 120 miles. From Shasta to Vaca-Dixon substation the distance over the 220-kv. lines is 142 miles and from Vaca-Dixon substation to Claremont substation in Oakland the distance is approximately 47 miles. This makes a total transmission of 309 miles. Some of this power also is distributed in San Francisco through Martin substation over the 70 miles of 100-kv. line between Claremont and Martin substations via Newark substation, making a total transmission distance of about 380 miles.

The single-line diagram shown in Fig. 1 indicates the present switching arrangement at Shasta substation. The incoming 110-kv. power is metered and then passes through a Westinghouse type G22 110-kv. oil circuit breaker to the main transformer bank. Figure 2 shows this equipment. The 110-kv. switch structure is of the standard type used throughout the system of the Pacific Gas and Electric Company and is equipped with by-pass and disconnecting switches as well as line-grounding switches. The main transformer bank consists of four single-phase Westinghouse transformers (one spare) rated 13,333 kva. each, making a total bank

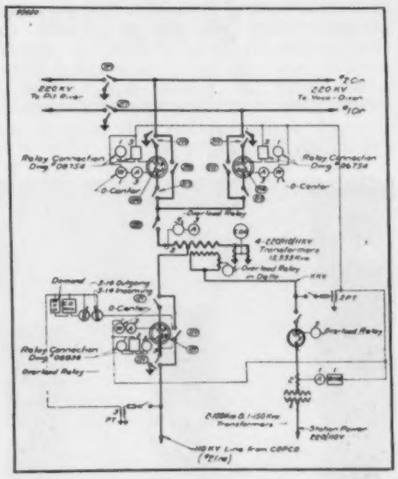


Fig. 1. Single-line wiring diagram showing methods of power control and metering. Shasta substation.

capacity of 40,000 kva. The main winding in these transformers is an auto-transformer to step from 110 kv. Y to 220 kv. Y with the neutral point solidly grounded. In addition to the auto-transformer winding there is a tertiary delta winding with a capacity of 40,000 kva. at 10 kv. At present this tertiary delta is used only to supply incidental power for station use, but is available for the operation of a synchronous condenser should one be required at a future date.

From the 220-kv. terminals of the main transformers the line passes through a single air-break switch and then divides for connection to either of the Pit-Vaca lines through Westinghouse type G-2 220-kv. oil circuit breakers. The 220-kv. switch and bus structure is of the same general type previously constructed at other stations on the 220-kv. system of the Pacific Gas and Electric Company and is shown in Fig. 3. Each oil circuit breaker is equipped with by-pass and disconnecting switches built by the Pacific Electric Manufacturing Company. These air-break switches are of the same type originally designed for use on the 220-kv. system when it first was put into operation between Pit River power house No. 1 and Vaca-Dixon substation.

Figure 4 shows the station-service transformer bank. Lead-covered cables connect the tertiary delta of the main

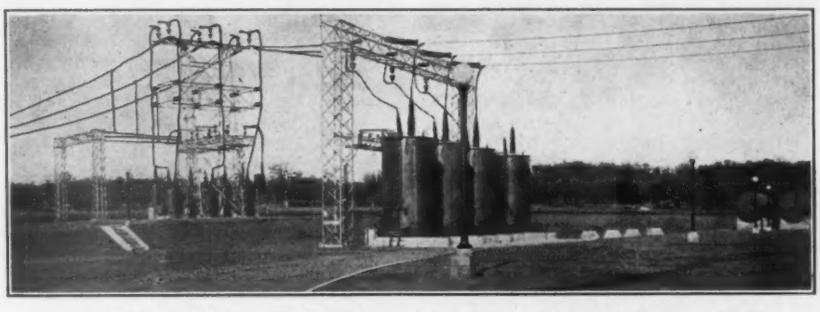


Fig. 2. Main transformer bank and incoming 110-kv. line switch. Shasta substation.

transformer bank to the bus supplying the station bank. This bank consists of two 100-kva. and one 150-kva. transformers to supply 3-phase 220-volt power for pump motors and other small power requirements as well as 110/220-volt service for lighting. The bank is controlled by a Westinghouse type O-221 37-kv. oil circuit breaker. Although the primary voltage of this bank is only 10 kv. it was found necessary to use a higher voltage oil circuit breaker in order to get an outdoor breaker with a rupturing capacity sufficient to permit its installation so near the power concentrated in the 220-kv. transmission lines. The small transformers shown on the right of the station-power bus structure are potential transformers to supply all meters and relays with the exception of the meters on the incoming 110-kv.

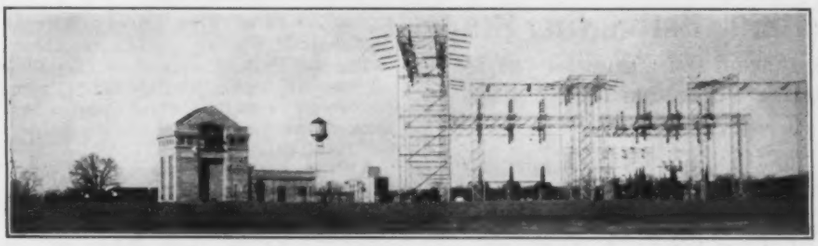


Fig. 3. Side view station building and 220-kv. bus structure. Shasta substation.

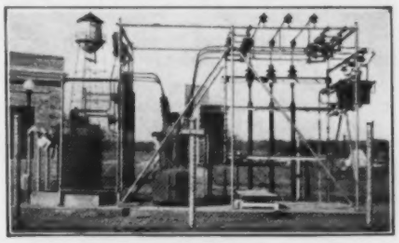


Fig. 4. Station power service bank and equipment. Shasta substation.

power. These latter are cared for by a separate installation of 110-kv. current and potential transformers.

At present the main substation building is of somewhat odd proportions. Its design may be understood better if some of the factors entering the problem are mentioned. Its only function

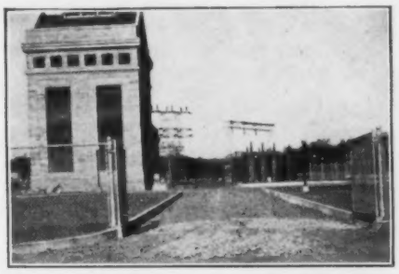


Fig. 5. Front view Shasta substation; main transformer bank in background.

now is to house the main switchboard, transformer cooling-water circulating pumps, storage battery and motor-generator charging sets and to provide facilities for handling one of the main transformers in case repairs are necessary. The main transformers are 26 ft. 8 in. high from rail to top of high-tension bushing. This necessitates a high entrance door and crane rail as well as an untanking pit to permit removing the core.

Future possibilities of this station were an important factor in the design of the plant. It is laid out to permit expansion in practically any direction. The building has a temporary end to permit extension for the housing of synchronous condensers. These at present are unnecessary, but it is entirely within the realm of possibility that the future may see a 220-kv. trunk line running north into Oregon and Washington. In this event Shasta substation will become an important switching junction and probably will have a large synchronous condenser installation to care for voltage regulation on the 220-kv. lines. For this reason the present installation was made extremely flexible, and all construction was made with the idea of future extension with the minimum possible alteration to existing equipment.

Line Tester Does Job Well and Does it Safely

By W. E. RICHMOND, San Diego Consolidated Gas & Electric Company, San Diego

Ordinarily the routine testing of arc circuits by the operators at the stations from which emanate the circuits is fraught with a certain element of danger to those who either normally or accidentally might be in the immediate vicinity of such a circuit at the moment of its testing. This is due to the high voltage sometimes used for this testing purpose and the potential power behind that voltage.

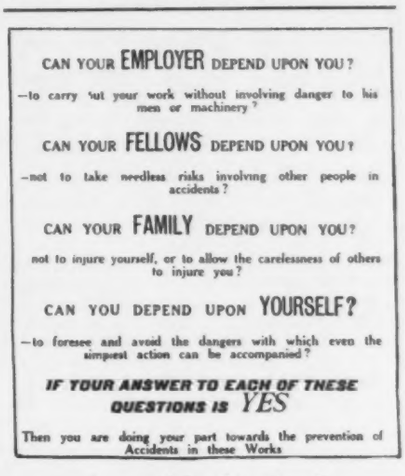
A portable, safe, convenient and effective circuit tester is used by the San Diego Consolidated Gas & Electric Company. These devices are made in the shops of the company and consist simply of a No. 5007 Ford unit spark coil, a spark gap, single pole snap switch and three ordinary dry cells. The batteries, of course, are connected through the snap switch to the primary terminals of the spark coil. The high-tension terminals of the coil are connected to 5-ft. rubber-insulated leads, one of which has the spark gap in series. Insulated spring clips facilitate attaching the leads to the circuit terminals. A carrying strap enables the set to be transported easily.

The set is used for supplementary tests after ordinary magneto tests have indicated the circuit to be open. A loose lamp, corrosion in a cutout, or a poor contact anywhere in the circuit might introduce into the circuit a resistance sufficiently high to necessitate a high voltage to break it down. If this high voltage be supplied from ordinary station sources, the potential power behind it will be distinctly dangerous to those who might be near the line, as previously mentioned.

The equipment here described will bridge any resistance that the normal potential of the arc circuit will bridge, and at the same time it is perfectly safe to linemen who may be working on the line. In using the set the gap is set as close as possible in order that maximum potential may be imposed across the high-resistance spot in the line. The gap itself is merely to indicate whether or not the current is flowing around through the arc circuit.

The set may be used whenever necessary without the delays incident to ascertaining that all linemen are clear of the line. Its use also saves the patrolling of the lines due to false indications often given by the magneto tester. The apparatus will not close the circuit through a film cutout or through all cases of corrosion sufficiently for low-potential or magneto current to flow subsequent to the test. However, it will give sufficient indication at the spark gap to show whether or not the circuit is in such a condition as to be operative at the normal arc potential. The apparatus described is shown in the accompanying illustration.

Showing simple arc-circuit testing apparatus using small spark coil.


CAN YOUR EMPLOYER DEPEND UPON YOU?
—to carry out your work without involving danger to his men or machinery?
CAN YOUR FELLOWS DEPEND UPON YOU?
—not to take needless risks involving other people in accidents?
CAN YOUR FAMILY DEPEND UPON YOU?
not to injure yourself, or to allow the carelessness of others to injure you?
CAN YOU DEPEND UPON YOURSELF?
—to foresee and avoid the dangers with which even the simplest action can be accompanied?
IF YOUR ANSWER TO EACH OF THESE QUESTIONS IS YES
Then you are doing your part towards the prevention of Accidents in these Works

A suggested safety placard.

IDEAS FOR THE CONTRACTOR

California Electragists Continue Estimating Study

Second Lesson in Electragist System of Estimating Given to Members of the Southern Division

By C. J. GEISBUSH, Executive Secretary

Teaching the Electragist system of estimating is one of the most important activities of the California Electragists, Southern Division. The first lesson in this work was given at group meetings in the various districts, each person present being supplied with a photostat of the plan showing the electrical layout and a set of the Electragist estimating sheets. Details of this lession were given in the July 15, 1925, issue of the Journal of Electricity, pp. 62 and 63.

While this first lession served a very useful purpose in acquainting our membership with the methods used in making the layout of a job, taking quantities of material from a print and coverting these quantities into labor, the committee was of the opinion that it would be necessary to carry on this work in a more detailed fashion in future lessons in order to familiarize the membership with the use of the Electragist manual of estimating.

Each member was furnished with a floor plan and elevation of a machine shop drawn to ⅛-in. scale. On this plan appeared the location of all machine foundations, motors, compensators, remote control stations and the location of the main switchboard. No details of individual circuits were given. The feeder schedule shown in Table I also appeared on this plan.

In addition to the plan, the following set of specifications was drawn up to accompany it:

SPECIFICATIONS
for
ELECTRIC POWER INSTALLATION
IN THE
MACHINE SHOP
for the
CALIFORNIA ELECTRAGISTS
Southern Division

This contractor shall furnish all labor necessary to install material as shown on the plans or herein specified for the complete power installation.

All work shall be in accordance with the rules and regulations of the National Board of Fire Underwriters as of the 1923 Edition.

The work shall consist of installing all conduit, wire, switchboards, compensators, remote-control push buttons, connecting up and testing motors for rotation.

All motors, compensators, push-button stations and clamped supports for mounting compensators will be furnished by owner.

Conduit shall be continuous from switchboard to compensators, compensator to motor, with 4 ft. of flex steel of the same size as conduit for connection at motor. All conduit shall be installed in the floor before concrete is poured, except that no conduit shall be placed in or across machine foundations.

Main service shall be run under floor to rear of building with a vertical riser of 12 ft. above floor line.

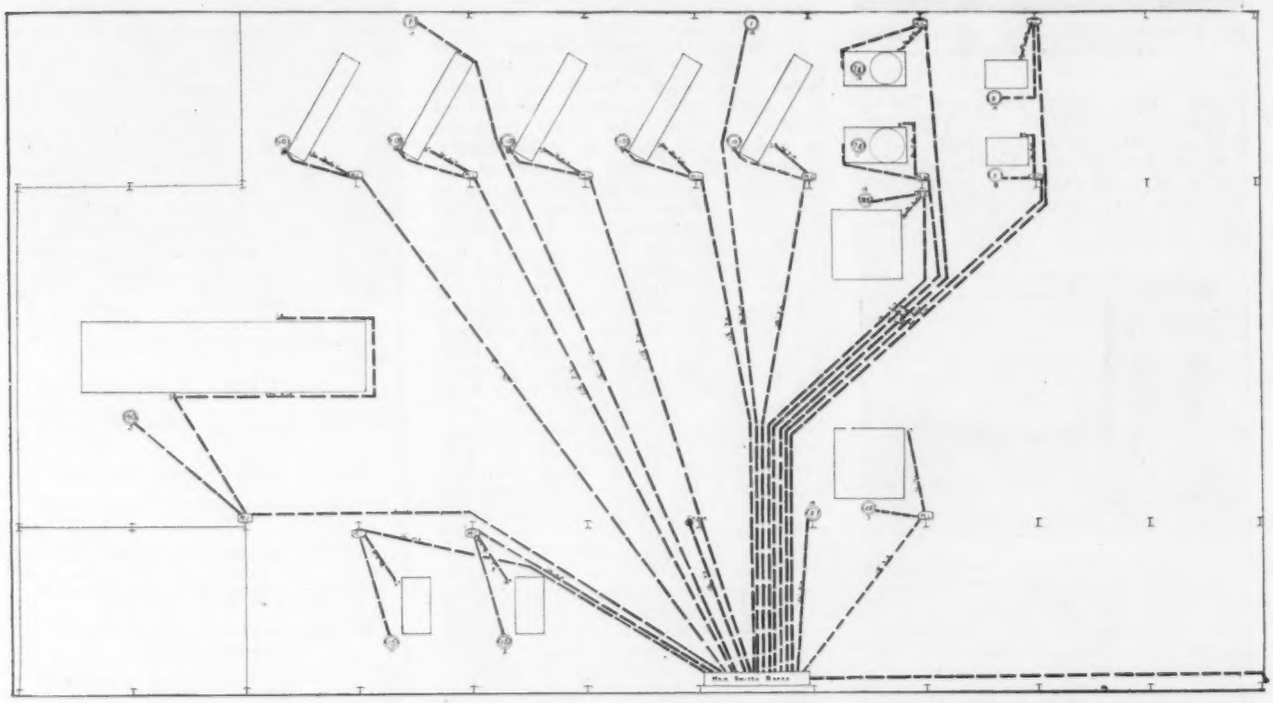
Conduit for conmpenstors, lathes, milling machines, emery wheels and push-button stations shall terminate 4 ft. above floor.

Conduit for punch press shall terminate 8 ft. above floor.

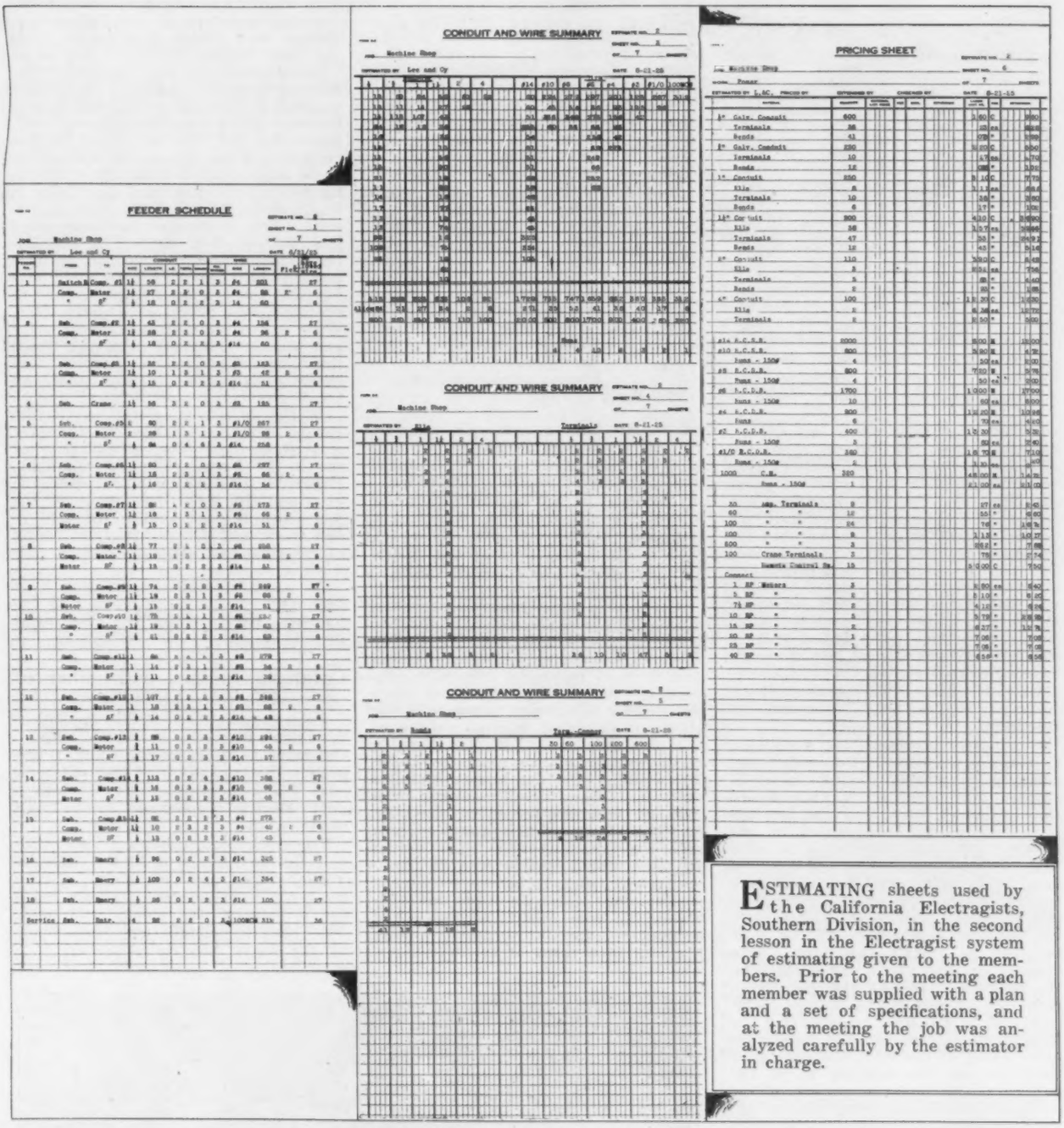
Conduit for crane motor shall terminate at bottom of truss and connection made at crane trolley wires.

Conduit for boring mills, planer and drill press shall terminate at floor line.

Conduit at switchboard shall terminate 6 in. above floor.



Plan of machine shop used in the second lesson in estimating by the California Electragists, Southern Division. This plan shows the job as it was laid out for presentation to the members.



ESTIMATING sheets used by the California Electragists, Southern Division, in the second lesson in the Electragist system of estimating given to the members. Prior to the meeting each member was supplied with a plan and a set of specifications, and at the meeting the job was analyzed carefully by the estimator in charge.

Switchboard shall be dead front, dead back and standard construction as used in southern California.

Symbols shown on plans are those adopted by the Association of Electragists, International.

PLANS TO BE RETURNED TO THE OFFICE AS SOON AS POSSIBLE.

Method of Procedure

A set of plans and specifications was sent to each member of the association, together with a bid form to be returned to the office stating the number of man-hours of labor necessary to install the electrical wiring in accordance with the plans and specifications.

With this material at hand it was requested that each member participating in the problem make a layout of the detailed electrical installation and then estimate the man-hours necessary to complete the job. The member was not requested to use the Electragist figures in estimating the work, but was required to reduce his estimate to a man-hour basis so that a comparison easily could be made when the meeting was held for his group.

Following the return of the bid forms a series of meetings was held in the various districts, at which time the job was discussed from the standpoint of the Electragist method. A large-sized plan was prepared showing the job as laid out by L. C. Baltzelle, and each member was requested to perform the operation of estimating this job with the assistance of Electragist instructors. After the material had been taken from the blueprint it was converted into labor by the use of the manual of estimating. Each person present was supplied with a copy of the Electragist manual and the following procedure was adopted:

The instructor called out a quantity of material of a certain classification, and the member was requested to give the man-hour rate as indicated in the proper table of the manual. This made it possible for every person in the room to take an active part in the estimating of the job. To save time the extension for the various quantities was given by the instructor.

Many very interesting results have been obtained from this second lesson of estimating. After the first few lessons had been completed the instructors decided to try an experiment to test each member as to his knowl-

TABLE I—FEEDER SCHEDULE

The following size conduit, wiring and switches shall be used.

Motor No.	Hp.	Switch (amp.)	Conduit (in.)	Wire size	REMARKS
1	15	100	1¼	4	Punch and shear press
2	15	100	1¼	4	Punch and shear press
3	25	200	1¼	3	Boring mill
4	25	200	1¼	3	Crane
5	40	200	2	1/0	96-in. planer
6	10	100	1¼	6	Lathe
7	10	100	1¼	6	Lathe
8	10	100	1¼	6	Lathe
9	10	100	1¼	6	Lathe
10	10	100	1¼	6	Lathe
11	7½	60	1	8	Radial drill
12	7½	60	1	8	Radial drill
13	5	60	¾	10	Milling machine
14	5	60	¾	10	Milling machine
15	20	100	1¼	4	Boring mill
16	1	30	½	14	Emery wheel
17	1	30	½	14	Emery wheel
18	1	30	½	14	Emery wheel
Service		600	4	1,000,000 circ.mil	

edge of time required to install one particular part of the job. As the meeting started, those present were requested to write on a piece of paper furnished him the time in man-hours required to prepare and install the three 1,000,000-circ.mil cables used for the main service. It was explained that this would require approximately 320 ft. of wire; that the 4-in. conduit was installed and there were two bends in the run. The wire could be pulled from either the switchboard end or the loading platform. The time allotted for this estimate was approximately 15 min. The estimates were collected to be used later in the meeting.

When the instructor reached that part of the pricing sheet on which was noted the 1,000,000-circ.mil cable he stopped and noted on the blackboard the estimates for this part of the work handed to him earlier in the evening. It was surprising to note that these estimates varied from 4 man-hours to 78. Those present were as genuinely surprised as the instructors and took considerable interest in the detailed explanation of the time required to install the wire. This explanation was given immediately by the instructor, and all members were requested to join in and express themselves as to the time required for the jacking up of the reel, the measuring and cutting of the wire, the fishing of the pipe and the drawing in of the pulling cable, the arrangement of the blocks and tackle necessary for pulling, the connection of the cable to the pulling rope or cable, and at last the actual pulling of the wire. The instructor called attention to the fact that 320 ft. of 1,000,000-circ.mil cable would weigh approximately 1,300 lb. and the reel an additional 200 lb. In every case the time as noted by the members present was very near to that of the Electragist manual of estimating after the instructor had called attention to the many operations necessary for the pulling of such large cable.

This little test was the most effective medium employed in the teaching of the Electragist method of estimating and brought out the fact very clearly that the average contractor, when called upon to figure any large-sized wire, depends upon his memory and thinks of only two classes of jobs: first, the job in which he had no end of trouble—found his pipe plugged, had his fishing cable break and such kindred annoyances as tend to make even the best of men tear their hair—or, second, the job in which the wire almost fell into the pipe, requiring no particular attention on anybody's part. Of the two it would be better to choose the first because ample time would be figured.

A valuable suggestion was received during this second series of lessons from L. C. Baltzelle of the Farley Electric Company, Fullerton, Calif., who uses an ingenious system in connection with the layout. After placing a piece of tracing paper over the blueprint furnished him an outline of the plan was drawn and the location of the various machines was indicated. The detailed electrical layout was made on this. The tracing provided him with an accurate record of the plan furnished him, and this was filed in a rack for this purpose. In an actual job this would enable him to know whether or not any changes were made in the plans after he made his estimate. It also would eliminate the necessity of marking up the plan supplied by an achitect or contractor.

It eliminates a great deal of the personal equation in estimating, and anyone may obtain information from this plan without having to depend on the individual who may have made the original estimate. Again, it frequently happens that considerable time elapses between the time of making an estimate and the time of award of the contract. This permanent record enables anyone to know exactly what was figured at the time and just how it was planned to install the various circuits. This contractor has been using this method on a number of installations since that time and finds it to be entirely satisfactory. This extra layout also saves a great deal of time in checking over work at a later date. Wire and conduit sizes, fuse capacity and similar data are available from this and eliminate the necessity of checking up each of these items on the job.

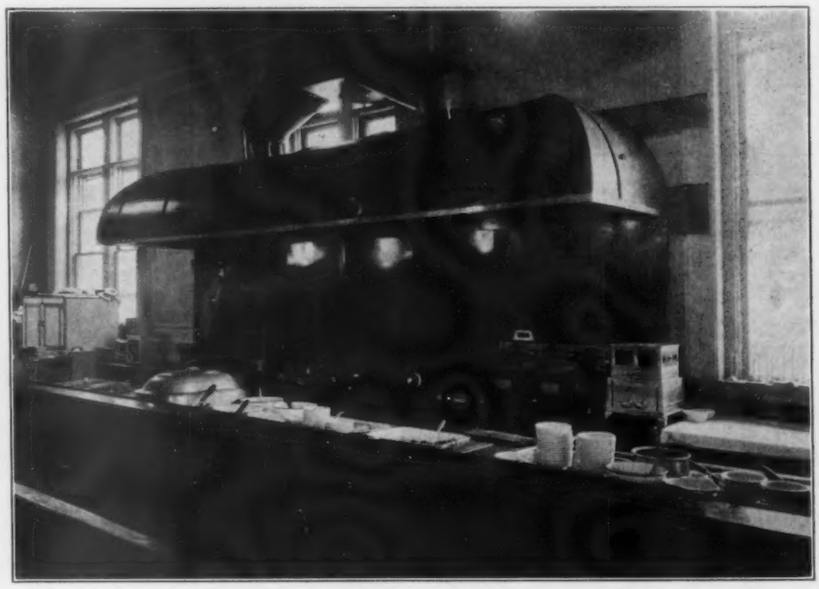
In the discussion of the job at the various district meetings the secretary was assisted by Lee C. Baltzelle of the J. J. Farley Electric Company, Fullerton. Mr. Baltzelle prepared the plan and the large-size layout of the job which is used as the standard in this work, and always has given freely of his time and effort in making this work a success.

As a result of the lessons that have been presented a large number of the members have adopted the Electragist method in all of their estimating.

Cafeteria Installs a Number of Electric Appliances

Food prepared on electric appliances is being featured by the Southern Cafeteria in Bakersfield, Calif. The progressive managers of this cafeteria have found their investment in heavy-duty electric appliances to be well worth while.

The equipment includes a 9-kw. 220-volt Edison griddle, a 4.2-kw. 220-volt waffle iron, and a 5.5-kw. Strite toaster. Provision also has been made for a hotplate for steaks and eggs. The electric installation was made by the Jason Electric Company.



The Southern Cafeteria, Bakersfield, Calif., is featuring food cooked on its electric equipment.

Questions and Answers on the Code and Safety Orders

Arrangements have been made with Claude W. Mitchell, electrical engineer of the Board of Fire Underwriters of the Pacific, to answer through the columns of the Journal of Electricity such questions on the National Electrical Code as are of general interest.

Similar arrangements have been made with George E. Kimball, electrical engineer of the Industrial Accident Commission of the State of California, to answer questions on the Electrical Safety Orders issued by the Commission.

While it is the object of this department to assist in a better understanding of the Code and the Safety Orders, replies given are not to be considered as official interpretations applying in all instances, as some of the rules permit of varying interpretations under different conditions. The questioner should be guided by the inspection department having jurisdiction.

All who are interested are invited to send in their inquiries regarding the National Electrical Code to Claude W. Mitchell, Board of Fire Underwriters of the Pacific, Merchants Exchange Building, San Francisco, Calif., or to the Editor, Journal of Electricity, 883 Mission Street, San Francisco. Questions on the Safety Orders should be sent to George E. Kimball, Industrial Accident Commission, State Building, Civic Center, San Francisco, or to the Editor.

Q. 12. When and where is it permissible to use "loom?"

A. Attention is called to the fact that "loom" is the trade name for flexable tubing manufactured by one firm. Because of the fact that "circular loom" was one of the first, if not the first, to be put on the market, many of the electrical workers still refer to all flexible tubing as "loom."

Reference to the April, 1926, list of inspected electrical appliances issued by the Underwriters' Laboratories shows that under the heading "Tubing, Flexible" there are now seventeen firms manufacturing flexible tubing which meets Laboratories' requirements and bears their label.

In new work flexible tubing should not be used in lieu of porcelain bushings. In an old building or in other places "where it is impracticable to employ insulating supports, the wires, if not exposed to moisture and if operated at a potential not exceeding 300 volts, may be fished if separately encased in approved flexible tubing extending in continuous lengths from one support to the next or to the outlet, or from one outlet to another; otherwise, approved conduit or approved armored cable shall be used."

At outlets, on some switch legs, at distributing centers, meters, or other places where space is "limited and the 5-in. separation cannot be maintained, each wire shall be encased in a continuous length of approved flexible tubing.

"Vertical wires exposed to mechanical injury on side walls shall be protected by a substantial boxing, extending upward to a point not less than 7 ft. above the floor, said boxing closed at the top by bushed holes through which the wires pass, and providing an air space of 1 in. about the wires. A sleeve of metal pipe may be substituted for the boxing, in which case the insulation of each wire shall be reinforced by approved flexible tubing extending from the insulating support adjacent to one end of the pipe to the insulating support adjacent to the other end."

Flexible tubing shall be used at outlets instead of bushings. "Approved outlet boxes or plates shall be installed at all outlets, and the flexible tubing shall extend from the last knob into and be secured to such boxes or plates."

It is well to note in this connection that the tubing shall be secured to outlet boxes or plates. This requires the use of flexible tubing fasteners. Of these there are nine listed by Underwriters' Laboratories, including two manufactured in San Francisco.

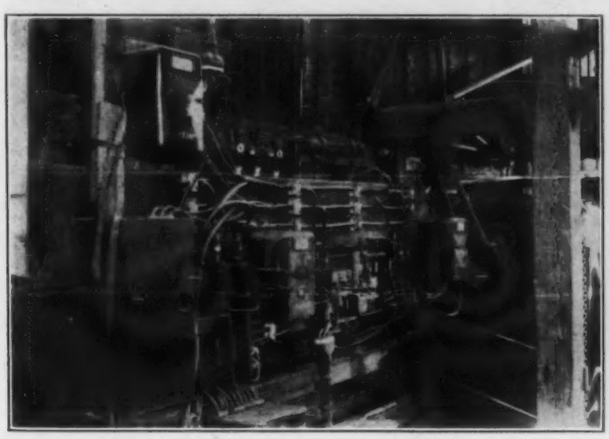
Installation Revised When Hazard Is Realized by Owner

Hazards existing in old electrical installations often are not realized by the owner until an accident occurs. The San Diego Onyx and Marble Works had added to their original installation as the business expended. As the original installation was made some ten or fifteen years ago open knife switches were used. The added load in the plant caused low voltage to be supplied to the motors. A complaint was made to the power company, which sent a man to make tests at the plant. While making tests of the wiring the man received a severe electrical burn, due to the open wiring.

This accident made the owners realize the electrical hazard which existed in their plant. The California Electric Works was called to remedy the condition. After making a survey of the plant, the entire installation was rewired. Externally operated switches were installed, and all wires were enclosed in conduit or metal troughing. The load was divided into three subcircuits each individually metered so that accurate cost records might be kept for each department. These were the sawing, flat or polishing and the turning shop.

Conditions similar to this probably exist in many places and will remain so until some accident occurs to call the hazard to the attention of the owners. It is a condition which might be remedied by re-inspection by the electrical department. Re-inspection would be a real service to the owner, the employees and the public.

H. G. Redfern, district manager of the San Joaquin Light & Power Corporation, affixing the Red Seal meter sticker to the home of Mrs. L. C. Temple, Dinuba, Calif. The home is the first Red Seal home in that locality and is a good example of a moderately priced electric home. Mr. Redfern is vice-chairman of the Red Seal campaign in that territory.



The old installation in the San Diego Onyx and Marble Works. Note the open knife switches. The hazard was not realized by the owners until a man was burned while testing for the cause of low voltage.

The revised installation made by the California Electric Works. Externally operated switches and conduit or metal troughing were used throughout. The three meters for cost records may be seen on the right.

BETTER MERCHANDISING

Denver Window Decorator Winner of Over Hundred Prizes

Eugene T. McSpadden, display manager of the Public Service Company of Colorado in Denver, has won more prizes and been accorded more honors in window-trimming contests than any other Western utility company employee. Although only twenty-four years old and without any special training in that line, in the two years he has been in Denver he has received nearly a hundred prizes, mostly cash, and ranging from $5 to $75.

He was born in Knoxville, Tenn., and later attended Virginia Polytechnic Institute. His first business appointment was in 1920 with the Amarillo (Texas) City Light and Power Company, one of the Doherty subsidiaries. Later he was transferred to the Bristol Gas & Electric Company, Bristol, Tenn., another Doherty property, and the record he made in window trimming took him back to the Amarillo company and then to Denver in 1924, when the larger commercial program was launched by the Public Service Company of Colorado.

To Mr. McSpadden the credit has been given for the pleasing innovation on the display floor of the company in Denver of the score or more of singing canary birds.

National Association Formed by Radio Jobbers

The Jobbers Radio Association of America, Inc., an organization composed of representative radio wholesalers from all parts of the United States, was formed at a series of meetings held at the Ambassador Hotel, Atlantic City, May 11-12.

One of the first acts of the Jobbers Association was to begin the construction of a code of ethics designed to correct some of the chaotic conditions now prevalent in the radio industry, with the expectation that, working with existing associations of manufacturers and retailers, the legitimate wholesalers may lend active and forceful aid in the general effort to stabilize the business and assure the public better service and better values in radio merchandise.

The new organization will hold its first annual meeting in New York at the time of the radio shows in September.

Meanwhile it has launched an active campaign to build a strong nation-wide membership, restricted to fully qualified wholesalers selected for their high standing and facilities for sound marketing of standard radio products.

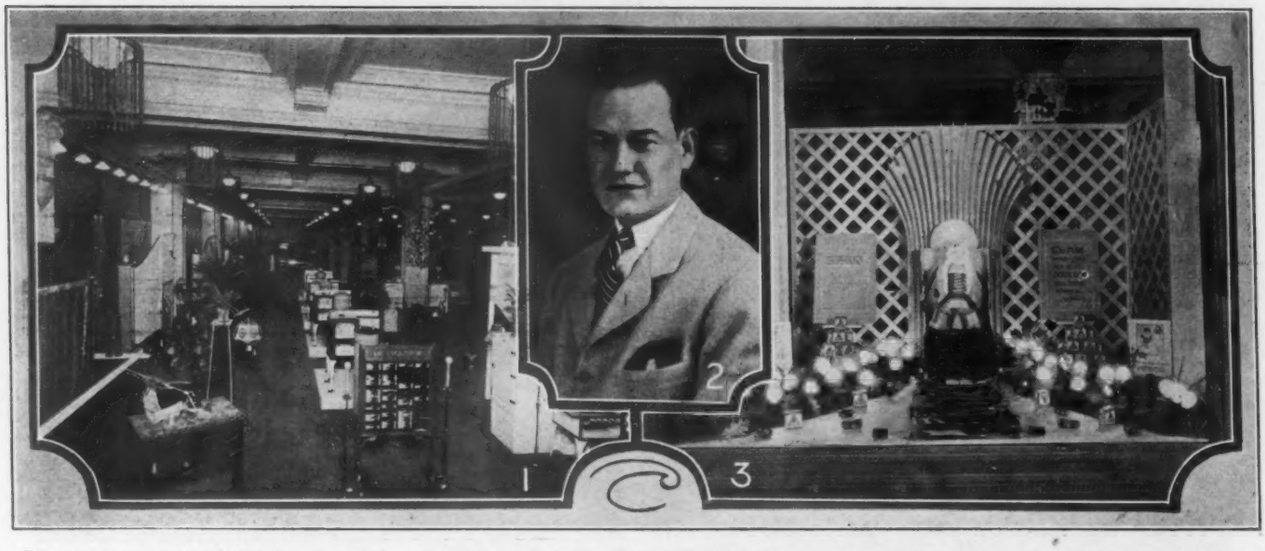
Coast Counties Company's Salesmen Study Electric Refrigeration.—The agents and salesmen of the Coast district of the Coast Counties Gas & Electric Company, Santa Cruz, Calif., recently spent two days in San Francisco in intensive study of electric refrigeration and electric air and water heating. During the session they attended the sales school of the Delco Lighting Company where they were given the latest information on electric refrigeration, and also visited the establishment of the Sandoval Sales Company where the subject of electric air and water heating was discussed thoroughly.

Bureau June-Bride Campaign Gets Response in All Quarters

Response to the California Electrical Bureau's annual June Bride sales campaign this year has been almost unanimous, according to Victor W. Hartley, executive secretary, and indications point to a large number of entries in the contest for the window-display prizes offered by the Bureau.

Pointing to the estimates that there will be over 50,000 weddings in California this year, a large proportion of which will occur in June, and that an average of ten gifts is made to each bride, or a total of 500,000 wedding presents, the Bureau made the suggestion to electrical dealers throughout the state that electrical gifts should constitute a large share of these. Instead of confining the activity with respect to June-Bride sales to one week as heretofore, the Bureau this year urged a full month's activity in appliances of every sort.

To stimulate attractive window displays of electrical merchandise, which should result in increased sales to the dealers using them, the Bureau has offered six prizes for the best decorated windows. The prizes are $50, $25, $20, $15, $10 and $5. Further provision is made that every dealer sending in a photograph of his window display as an entry to the contest shall receive from the Bureau $1.50 to reimburse him at least in part for the cost of the photograph, whether or not he wins a prize. Photographs of windows are to be sent to the California Electrical Bureau, 447 Sutter Street, San Francisco, not later than July 7.



Winner of over a hundred prizes for window decoration and design, Eugene T. McSpadden (inset), display manager of the Public Service Company of Colorado, recently added to his achievements by innovating a decorative scheme for the merchandising floor of the company using a number of cages of singing canary birds (left). At the right is shown one of Mr. McSpadden's prize-winning windows displaying double convenience plugs.

The Bureau has had printed and is distributing to all dealers in electrical merchandise a large poster to be used as part of window displays. The only provision made in the contest is that this poster is to be included in the window display. These posters are being furnished to dealers without cost.

Advertising assistance, jobber co-operation, and other means of furthering June-Bride electrical gift purchases have been undertaken by the Bureau in connection with the window-display contest.

Correction.—In the advertisement of the Electric Heating & Manufacturing Company carried on page 93 of the May 15 issue of the Journal of Electricity an error appeared. Holmes and Sanborn were the consulting engineers for the builders of the Asbury Apartments in Los Angeles and had complete charge of the engineering work on that building, and it was, therefore, under their supervision that Apfel's systems of electric heating were installed in the Asbury Apartments.

Electragists Report Large Load Increases on Appliances

"To those who feel that the electrical dealer is not doing a good job in the sale of electrical appliances it might be interesting to note," says a recent bulletin issued by the California Electragists, Southern Division, "that our members sold 1,473,109 watts of electrical appliances since the first day of last November as evidenced by the following summary of wattage reports which have been turned in to this office:

Month	Reports	Wattage	Specials	Wattage
November	11	98,038	2	2,000
December	13	404,870	3	11,200
January	29	348,000	74	48,000
February	27	205,000	160	89,000
March	24	213,050	99	54,310
April	23	205,109	61	28,600

These sales, the report goes on to show, represent only one-quarter of the membership. The "specials" referred to in the table represent the number of appliances upon which a monthly special sales effort was being made and which were reported sold, and the wattage represented by these specials. Members of the Electragists are being urged by the officers of the organization to return cards to them with reports each month as to appliance sales. It is pointed out that the importance of the electrical dealer in the building up of central-station load may be shown better by these reports of actual sales and results.

Kelvinator Representative Tells Refrigerator Sales Policy

Too late to be included in the list of statements of representatives of electric-refrigerator companies in the special number of the Journal of Electricity devoted largely to refrigeration (Journal of Electricity, April 15, 1926, p. 306), was the statement of the Kelvinator representative, L. D. Robertson, vice-president of the Collins Kelvinator Corporation.

His statement of the Kelvinator policy is as follows:

"We have just started on a plan of training salesmen and then work them in groups covering such territories as the city of Los Angeles in an intensified manner by dividing the city into zones and one group working each zone. This plan is very similar to that used by washing-machine and vacuum-cleaner concerns.

"We have a plan whereby electrical dealers can take orders for Kelvinators, their only investment being one sample. The dealer working under that plan turns his orders over to us and we install and service the machines which he sells.

"The Kelvinator Corporation does the national advertising and it is up to each local distributor and dealer to do his own advertising.

"The Southern California Edison Company is selling Kelvinators through its offices and we have one man who spends most of his time covering its offices and co-operating with them in every possible way.

"The Ontario Power Company also handles Kelvinators, but as it handles only Kelvinators and acts as our dealer exclusively, it is on the regular dealer's basis, working its own salesmen."

Tests Demonstrate Electric Heating Is Economical

Records Taken for Typical Residences in Seattle Show Electric Bills Comparable to Other Fuel Costs

That electric heating is economical is given further proof in the accompanying table showing the cost of electric service for ten typical residences in Seattle. The data were compiled by P. F. Apfel, president of the Electric Heating & Manufacturing Company of Seattle, which is doing a good deal in the way of pioneering electric air-heating for residences and apartment houses.

The figures given show results in ten typical Seattle homes for the period of a year. All conditions affecting the cost of services are considered in the analysis—the number of rooms, number of stories to the house, the number of registers installed, the heating load for the house, whether an electric range or water heater is used, whether or not a separate meter is used for heating load, what other appliances are used, and the number of light outlets in the home. Monthly bills for each month for a year then are enumerated, with the average bill given at the bottom of the table. Each of the bills represents, therefore, lighting, heating and cooking.

In commenting on the figures Mr. Apfel concluded, "We have many other residence in process of completion at the present time and we think it is high time that the electrical industry itself should be sold on electric heating."

Records of Electricity Costs in Ten Typical Seattle Residences Equipped with Electric Air-Heating

House No.	A	B	C	D	E	F	G	H	I	J
Number of Rooms	3	3	3	5	5	5	7	7	7	7
Number of Stories	1	1	1	1	1	1	2	2	2	2
Number of Registers	4	4	5	7	7	7	13	17	13	12
Heating Load	8kw.	8kw.	9kw.	17kw.	17kw.	18kw.	26kw.	29kw.	28kw.	24kw.
Electric Range	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Electric Water Heater	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
On Meter	no	no	no	no	no	no	no	no	no	no
Vacuum Sweeper	yes	yes	no	yes	yes	yes	yes	yes	no	yes
Washing Machine	no	yes	no	no	no	no	yes	yes	no	yes
Number of Lights	18	26	16	24	26	28	40	51	40	42

Electric Bills

(Including lighting, heating and cooking.)

House No.	A	B	C	D	E	F	G	H	I	J
February, 1925	14.00	10.50	14.15	26.50	23.50	24.10	25.00	26.30	25.10	27.70
March	11.00	10.00	13.55	16.25	19.65	23.75	22.00	24.30	26.50	28.40
April	5.75	6.50	7.25	11.40	17.30	18.50	16.00	14.70	16.60	18.10
May	3.50	4.75	4.45	7.25	17.75	10.00	10.25	6.30	7.10	10.40
June	3.75	4.60	4.35	5.00	9.70	6.80	5.75	6.30	3.80	8.60
July	4.45	3.25	3.80	4.20	12.10	6.35	6.75	4.20	4.80	7.20
August	4.55	3.00	3.05	3.60	9.00	6.95	7.25	6.00	3.60	5.00
September	6.75	6.75	9.25	12.20	7.65	7.90	9.25	6.80	7.20	7.60
October	5.85	8.40	11.05	13.40	8.50	15.20	18.75	19.00	15.50	23.80
November	12.30	15.00	11.55	19.90	16.50	21.10	29.00	23.80	31.50	25.30
December	11.35	16.50	19.40	27.60	21.25	25.05	26.75	33.60	37.40	33.00
January	12.75	16.00	17.90	25.50	14.10	23.15	29.25	36.80	35.60	28.00
Monthly Average	**8.00**	**8.77**	**9.97**	**14.40**	**14.75**	**15.74**	**17.20**	**17.35**	**17.89**	**18.60**

Ingenious "Lamp Merchandiser" in Greeley Office

Colorado Utility Believes in Using Plenty of Light in its New Office and Merchandising Store

Several noteworthy merchandising features are embodied in the new offices, salesroom and depot of the Home Gas & Electric Company at Greeley, Colo., where quarters recently were acquired and remodeled at a cost in excess of $50,000.

The building comprises a composite plant, housing in one location all departments of a concern that furnishes electricity not only to Greeley's 12,000 persons, but also maintains 100 miles of transmission line serving seven neighboring cities and a miscellany of power users scattered between. It not only meets the present needs as headquarters but provides for future growth.

Opening off the street by a central entrance is the sales floor for merchandise, 50x40 ft., providing 2,000 sq. ft. of space which permits the most advantageous display of everything from ranges down to the simplest appliance. At either side of the room are wall cases of the finest oak construction. One is a special globe merchandiser, designed by L. R. Storey, superintendent, and since widely copied in the Rocky Mountain states. The other is a brilliantly illuminated, glass-front case for the display of the better class of percolators, grills, waffle irons and similar appliances. Ranging between the two walls are miscellaneous tables, each devoted to a particular class of merchandise, while here and there over the floor are refrigerators, ranges, vacuum cleaners, floor lamps, and similar electrical appliances.

A lamp for every compartment and every lamp in its place in this well arranged lamp display and storage cabinet, called a "lamp merchandiser" by its designer, L. R. Storey, of the Home Gas & Electric Company, Greeley, Colo. It has been copied and used by many other merchandisers in Colorado.

The offices occupy the center of the room, the enclosure being built up some four feet from the floor with oak, with plate glass extending 3 ft. above that height. Everything is open to view. Two openings in the glass comprise stations for the cashiers. Directly in front of the office is a two-sided oak desk similar to that commonly provided in banks for the use of patrons.

Opening to one side of the offices are the vaults and storerooms for records. Adjoining them and accessible from the sales floor are rest rooms for women, with an ornamental drinking fountain just outside the entrance door.

At the other side of the room a wide stairway leads to the second floor. Opening off the landing midway up is the manager's office, built as a mezzanine. It is in full view from the floor and from it everything below can be seen. Back of the general offices on the main floor is the superintendent's office, while the meter-testing department occupies a corner in the rear of the room.

Takes its Own Medicine

This brings the account to mention of the lighting facilities. Here is one electric company that makes liberal use of the principal commodity it sells, furnishing a glowing example for the community to follow. Four rows of red, green and natural lamps extend along the ceiling from one end of the room to the other, the rows being equi-spaced. They contain a total of 520 lamps, each of 15 watts. In addition to these, 20 ornamental hanging fixtures of Ivanhoe silver tassel design are distributed over the room. Each carries 400 watts. The total overhead wattage in the room is 15,800.

Besides these, each pillar in the room carries wall lamps on four sides, while numerous other outlets around the walls and on desks are utilized. The windows, which are 20 ft. wide and 12 ft. deep, contain the entire array of floodlights adaptable to their illumination. The back panels of these windows extend to a height of only 4 ft. It is thus possible for passers-by at night to view the entire room in full illumination. As the ceiling is 16 ft. high and everything is finished in a manner to aid and emphasize reflection of the light, the ensemble picture presented is an impressive one. It goes without saying that the complete and attractive lighting facilities have been and are silent salesmen of great efficiency.

The entire second floor of the building, 50x125 ft., is dedicated to community usage. A partition has been erected 15 ft. from the rear, creating a kitchen, where electric ranges have been installed and connected.

Auditorium a Good-Will Builder

The remainder of the space is set aside as an auditorium suitable for luncheons, banquets, dances and similar social or business gatherings. The management has made it known that the hall is available and that various groups in the cities served are welcome to its use. The only charge is for janitor service. The Chamber of Commerce of Greeley, various of the luncheon clubs and other organizations make use of it for their banquets, while many women's clubs and church groups have utilized it for both day and evening meetings. The company also put it to advantageous use recently when a cooking school was held there. Provision of this auditorium brings hundreds of persons into the building for other than business with the company and fosters a spirit of good-will toward the concern.

The basement is finished completely, giving 6,250 sq. ft. of space there. One section of it is enclosed and is used for merchandise storage, with a separate stairway leading to it from the main floor. The remainder of the room is given over to storage of line supplies and general materials. Everything is kept in its place through a system of bins. Entrance is by a stairway at the rear. An elevator is provided for handling heavy materials.

To the rear of the main building is a concrete garage with a capacity of ten cars. In it are housed all the company's motor equipment, including trucks. Beneath the garage is a modern heating plant which supplies both buildings.

Lamp Merchandiser Is Unique

The electric lamp merchandiser on the sales floor greatly has simplified the work of retailing globes. It is 18 ft. long and 7½ ft. high. At the top in a horizontal line are 27 compartments, each containing a lamp, controlled by a switch below. Each of these compartments is finished inside with black. By switching on the various sizes and types of lamps, the customer can make an instantaneous

comparison and choose the one wanted. It is possible to demonstrate simultaneously or individually at an instant's notice all types of lamps carried.

Beneath these demonstration recesses are compartments for storage of the corresponding lamps, all of which are immediately available by opening hinged doors. The bottom 3 ft. of the case is divided off for carton storage of reserve stock, from which the shelf stock above is replenished as needed. Company officials state that one girl handling lamp sales can do the same amount of work as formerly in half the time. Customers are aided materially in getting exactly the lamp they want.

Mr. Storey, designer of the cabinet, has made no effort to protect his rights Plans have been passed along freely to other companies, and several in Colorado and neighboring states are now using cases built on the plans prepared at Greeley. Because of its oak construction and fine finish to harmonize with the rest of the woodwork, the Greeley model cost $600 to build. Cases of soft wood have been prepared for other offices for less than half this amount.

May Be Built in Sections

It is possible to build such a case in sections, making it applicable to use in any size of community, adding or eliminating sections as desired. With the new standardization of lamps in effect, the size of the case will be reduced materially and the cost cut proportionately.

The Home Gas & Electric Company retails power purchased from the Public Service Company of Colorado. It is a Greeley concern, with 150 stockholders. It does not furnish gas to the community, the title of the company retaining the word "gas" from bygone years.

Fred Norcross is manager of the concern, having been with it for a number of years. He has built it to a successful financial enterprise which gives excellent service. Mr. Norcross is allied with various public movements in Greeley and is a leader in the community. At present he is president of the Chamber of Commerce. Among his other duties is that of Boy Socut leader, and half a dozen drums in the assembly room of the company attest to the fact.

The Greeley company, in addition to serving the usual domestic and municipal demands for current, carries a load of 4,000 hp. on pumping plants for five months in the year during irrigation season. Learning that there is a strong underflow of water through many parts of the county, the farmers have installed motor equipment. The power factor is boosted to a desirable point by using synchronous machines.

The outlying cities furnished by the company are La Salle, Kersey, Eaton, Ault, Pierce, Nunn and Evans, all of which lie within a circle of a 10-mile radius, of which Greeley is the center.

Results from Merchandising Institute Lectures

McNally Company, Pasadena, Improves Windows as Result of Electragist Talks on Window Display

More than ten electrical contractor-dealers have changed and remodeled the windows of their stores as a result of the talks given on store-window display at the institutes held by the merchandising section, California Electragists, Southern Division. Better technique in window display, too, has been noted in each instance.

The success of the first institute has encouraged the merchandising section to plan and set in motion a second institute, conducted on similar lines to the previous one. (See Journal of Electricity, March 15, 1926, p. 231.) For this second institute it was planned to have Mr. Graham of the Chicago Flexible Shaft Company deal with the subject of selling socket appliances, and R. E. Smith, advertising manager, Southern California Edison Company, with dealer advertising methods and practice. This institute started in May and is to continue until meetings have been held in each of the centers of population of the southern part of the state.

One notable instance of dealer window improvement as a result of the last institute was that of the McNally Company of Pasadena. The previous arrangement of windows at this establishment was unsatisfactory.

The windows provided no back wall so that the attention of passersby was distracted from the window contents by a view of the interior of the store. The darkness of the interior by contrast gave the windows a mirror effect, cutting down their effectiveness.

Since remodeling, with a curtain background, attention is concentrated upon the merchandise on display. And the best part of the change was that it was made at comparatively little expense.

The curtain background was made of monks cloth, which presented a neutral tan background. An attractive border, made of orange velour and black silk fringe, was run along top and bottom of the curtain drape. On the reverse side borders of apricot-colored velour with gold fringe made it possible by turning the curtains around to get an entirely new effect. By varying the background thus in the two windows an effect of novelty was not difficult to obtain.

Window lighting in the McNally window also was improved upon advice from the institute. The 35 sq.ft. of space in each window now is lighted by three 200-watt units, one of which is a diffusing unit, one a spotlight, and one a daylight lamp with an angle-type reflector concealed in a lantern which hides it and prevents any glare from the street.

Several transparency signs which were on the window glass and obstructing the view have been removed, and more are to be removed later. In the interior all shelf goods have been installed in glass show cases. A large case, containing 50 compartments, takes care of all the shelf goods, affording each appliance attractive display space of its own.

Attractive yet simple arrangement of window of W. A. McNally Company of Pasadena as improved after window display institute talk.

Edison Company Announces Commercial Department Personnel Changes.—The following changes in the personnel of its commercial department have been announced by the Southern California Edison Company: P. S. Minner, Inglewood district manager, has requested an extended leave of absence because of ill health. R. C. McFadden, Oxnard district manager, has been transferred to take charge of the Inglewood office, and H. A. Brody, Lindsay district manager, will replace Mr. McFadden at Oxnard. Carl Elgan, who has been assistant district manager in Pasadena, has been transferred to take Mr. Brody's place. H. S. Williamson of San Bernardino has been transferred to the Redlands district, and H. J. Moulton, Redlands district manager, will succeed Mr. Williamson at San Bernardino.

NEWS OF THE INDUSTRY

Cushman Plant of Tacoma Formally Opened in Celebration; File for Next Unit

In the midst of much pomp and ceremony, involving President Coolidge in the pressing of the key which opened the plant, army airplanes in aerial salutes, christening of the towers across The Narrows, and speeches from prominent advocates of municipal projects, the Cushman plant of the City of Tacoma was opened formally on May 24. Tests of the plant had been completed, however, some days before and power from the Cushman plant had been sent to Tacoma occasionally from the new units before the formal opening of the plant.

Simultaneously with the opening of Cushman plant, filings were made by the City of Tacoma with R. K. Tiffany, state supervisor of hydraulics, for a second unit of the development on the Skokomish River.

It was on March 23, 1926, one week after the preliminary celebration heralding the approach of Cushman power, that one of the 25,000-hp. units in the new Cushman plant of the City of Tacoma was synchronized on the line and its load built up approximately to 12,000 kw. Both units had been for some days in the process of being dried out and tested by the project engineers and manufacturers' representatives. This process continued until the plant was turned over to Ira S. Davisson, commissioner of light and water, and Llewellyn Evans, superintendent of the light department, to operate after the ceremony on May 24.

The project, in the development of which the two 25,000-hp. units installed in power house No. 1 constitute the first step, derives its name from former Lake Cushman, which lay in the gorge of the north fork of the Skokomish River in the foothills of the Olympic Mountains, some fifty miles northwest of Tacoma. At a narrow point in the gorge about four miles below the lake a constant-angle, concrete, arch dam, 265 ft. high, creates a storage basin 8½ miles long and 1 mile wide, impounding 450,000 acre-ft. of water and submerging the old Lake Cushman beneath 170 ft. of new and larger lake.

The water-wheel-generator units consist of two 27,500-hp. Allis-Chalmers, vertical turbines direct-connected to two 20,000-kva., 13,200-volt, 200-r.p.m. generators.

The dam, tunnels and power house were constructed under contract by A. Guthrie & Company, Portland.

From the switchyard to the terminal substation in Tacoma a double-circuit, 110-kv. transmission line follows a direct route a distance of 44 miles. Except for three water crossings, and for that portion of the line running through the city limits, the circuits are supported on separate wood-pole towers running parallel through a cleared right of-way 100 ft. wide. The steel for The Narrows towers was supplied and erected under contract with the Star Iron Works, Tacoma.

The present transmission circuits from power house No. 1 terminate at the Cushman substation, North 21st and Washington Streets, Tacoma. This station is designed to handle the entire output of the complete development, but for the present has installed transformation and control equipment only for that part of the development completed to date.

The transformers and condenser are of Allis-Chalmers manufacture; the 110-kv., 50-kv., and 13.2-kv. circuit breakers were supplied by the General Electric Company, while the Westinghouse Electric & Manufacturing Company furnished the switchboards, metering equipment and disconnecting switches. A Westinghouse carrier-current communication system connects the power house and the substations.

A second and third step, each designed to add 45,000 hp. to the present installed capacity, are planned as a later development in the project. This will make complete use of the 475-ft. hydraulic head between tailwater of the present plant and tidewater. A 180-ft. dam near Potlatch below the present power house No. 1 will raise the water level to that of the present tailwater. A concrete-lined tunnel some two and a half miles long then will deliver this water to a forebay at the same level from where it will be carried by steel penstocks down to two 45,000-hp. units in power house No. 2, situated at tidewater on the shore of Hood Canal directly below the forebay.

The Cushman development was built mainly by contract on the design and under supervision of the city's project engineers. J. L. Stannard was chief engineer, A. F. Darland was responsible for the electrical features, J. V. Gongwer for mechanical and structural design and B. E. Torpen for design and construction of the dam and tunnels.

The new filings on this project now seek the appropriation of 600 sec.ft. of water from the South Fork of the Skokomish River. The dam across the South Fork, according to the proposal, will be of concrete, 285 ft. high, 500 ft. long across the top, and will cost approximately $1,500,000. It is designed to deliver additional water through a 4-mile tunnel into the present reservoir. The estimated total cost of the new undertaking is $7,500,000.

View of Cushman power plant in course of construction.

Pacific Coast Division Wins Third Prize in Contest

A. M. Frost, San Joaquin Light & Power Corporation, chairman of the Pacific Coast geographic division of the Industrial Lighting Activity, was awarded third prize as geographic chairman at the national convention of the N.E.L.A. recently in the contest held in connection with the Industrial Lighting campaign.

In spite of the fact that the Pacific Coast is not regarded as an industrial empire, the showing made in the Industrial Lighting campaign in California, Nevada, Arizona and Hawaii was such that the district was awarded third prize in the national contest, it was stated. The work was divided into two parts, the first that under the supervision of the educational committee, with Clark Baker, National Lamp Works, as chairman, and the

second the sales work in charge of the various vice-chairmen.

Preliminary campaign meetings were held to educate contractor-dealer and power-company representatives to the benefits to be derived from the activity, methods for figuring lighting layouts, and methods of demonstrating the value of good light to industry.

Blank prospect cards were given to contractor-dealers upon which prospects were to be listed. These prospects were worked on by both dealers and power-company men. Direct-mail broadsides and letters were used as sales-promotion material. Co-operation was given by manufacturers and jobbers. The playlet, "What Price Light," secured audiences for the idea of better industrial lighting and proved an effective means of publicity.

Vice-chairmen in charge of the work under Mr. Frost in each district were as follows: R. V. Sanford, Tucson Gas, Electric Light & Power Company, for Arizona; O. S. Clifford, Truckee River Power Company, for Nevada; J. F. Fenwick, Hawaiian Electric Company, for Hawaii; and C. D. Montieth, Pacific Gas anr Electric Company; H. H. Allison, Great Western Power Company; R. C. Bragg, Vallejo Electric Light & Power Company; H. K. Griffin and G. A. Ferguson, Western States Gas & Electric Company; M. L. Foster, Coast Counties Gas & Electric Company; P. S. George, Coast Valleys Gas & Electric Company; Frank Weiss, Los Angeles Gas & Electric Corporation; C. M. Masson, Southern California Edison Company; W. R. Chawner, The Southern Sierras Power Company; G. D. Smith, Ontario Power Company; G. H. P. Dellmann, San Diego Consolidated Gas & Electric Company; and C. B. Merrick, San Joaquin Light & Power Corporation, for California.

The educational committee under Clark Baker, chairman, consisted of: D. Pence, Illinois Electric Company; C. O. Martin, Benjamin Electric & Manufacturing Company; F. Van Gilluwe, C. W. Cole & Company; R. S. Prussia, Westinghouse Lamp Company; C. A. Sanborn, Holmes & Sanborn; M. Hixson, Edison Lamp Works; T. F. McDonough, Benjamin Electric & Manufacturing Company; H. C. Barnard, Curtis Lighting, Inc. of California; W. A. Alden, Westinghouse Electric & Manufacturing Company; Leo Gianini, Edison Lamp Works; H. H. Robinson, Pacific Gas and Electric Company; and L. A. Hobbs, Edwin F. Guth Company.

Stanford to Make Electrical Course a Six-Year Course with New Ryan Laboratory

The course in electrical and other branches of engineering at Stanford University hereafter will consist of six years' work, divided into a four-year undergraduate period and two years of graduate work. Dr. Harris J. Ryan will continue to be dean of the electrical engineering department, with Theodore J. Hoover dean of the school of engineering.

The initiation of the new training scheme was marked by the recent completion of the building to house the Ryan Electric Laboratory and arrival of six transformer sets capable of developing 2,100,000 volts, single-phase, that now are being installed in the laboratory. Dr. Ryan, Clyde A. Binns, local representative of the General Electric Company, donors of the $117,000 apparatus to Stanford; and Associate Prof. H. H. Henline received the equipment at the end of its journey from Pittsfield, Mass.

For some years the idea of consolidating the engineering branches at Stanford had been discussed as part of the general tendency to organize the university into a series of schools. It met with considerable favor from the first. Following the recommendations of a committee appointed to consider the matter, the school now has been organized.

"This development of engineering education at Stanford and the look into the future implied therein," said Dean Hoover to a representative of the Journal of Electricity, "is based on a conception of the engineer and engineering as something vastly greater and more significant in modern life than just a man with a technical training and a sort of profession in which technology is the main ingredient.

"The engineer today, and much more so in the future, is and must be the man who controls the forces of nature and utilizes the material resources of the earth, and who organizes and directs human activities on these lines for the benefit of the race.

"As the stupendous total of our material assets constantly increases in bulk, and as man's environment comes more and more under his control, the engineer with each succeeding generation must take upon his shoulders larger and larger portions of the burdens of civilization. If engineers of the future are to justify their name and fame and the effort and expense put into their creation, there must be an improvement in their participation in public affairs; their sense of their public obligations must be further aroused, and a surer knowledge must be acquired of how to make their efforts effective.

"In working out the details of the School of Engineering at Stanford, it has been definitely decided that the four-year curriculum cannot be utilized for a professional training, hence the school has been placed on a six-year basis."

It also has been recognized that education in electrical engineering generally has suffered from too great specialization, according to Dean Hoover, to the detriment of fundamentals. It is this that the new school hopes to avoid.

By this move the degree of Bachelor of Arts in electrical engineering has been abolished. Hereafter the preliminary degree will be the Bachelor of Arts in engineering. After specializing during two graduate years, the degree of Electrical Engineer will be awarded.

Stanford's most important work will be carried out in the Ryan Electrical Laboratory, now complete. In this Dr. Ryan hopes to continue and expand his researches into high-voltage phenomena. As the Journal of Electricity of Sept. 1, 1925, p. 167, announced, the new laboratory is located south of the university, between Pine Hill and the Mayfield reservoir hill. The building is 173 ft. long, and its width 80 ft. The roof is supported on trusses to leave the interior free of supporting columns. The height from the concrete floor to the underside of the trusses is 50 ft. For safety to life and equipment, 20-ft. clearances have been provided everywhere around the main electrodes and corresponding points of application of the voltages to avoid discharges or destructive arc-overs.

Two-million-volt transformer set for the new Ryan Laboratory at Stanford University being received by Dr. Ryan for the University from the General Electric Company. Left to right are Clyde A. Binns, representing the General Electric Company; Dr. Harris J. Ryan, Joseph S. Carroll, and Associate Prof. H. H. Henline.

Application to Issue Securities Approved by Commission

The application of the Southern California Edison Company to issue $40,000,000 of 5-per-cent refunding mortgage bonds and $10,000,000 of series "B" 6-per-cent preferred stock has been granted by the California Railroad Commission. The company's general and refunding 6-per-cent bonds, due in 1944, will be called at 105 under the plan, and the balance of the funds from the sale of the securities will be used to reimburse the treasury for expenditures made for extensions and additions to its properties.

Announcement that the company's application to list its common stock on the New York Stock Exchange has been granted was made May 26, 1926. Listing on that exchange will give to the stock the nation-wide distribution that a stock of its rating warrants. It is believed that such standard proven stock, paying regular dividends, should have this advantage for greater stability.

Pouring of Concrete Started on Horse Mesa Dam

Actual work on the pouring of concrete has been started on the foundation of the Horse Mesa power dam being constructed on the Salt River by the Salt River Valley Water Users' Association, seventeen miles below Roosevelt, Ariz. In preparing for the dam bedrock, 34 ft. below stream level, has been cleaned thoroughly and then reinforced for an added depth of 50 ft. by the injection of Portland cement under heavy pressure in a large number of holes drilled at frequent intervals. This precaution is expected to close any possible fissures and insure against leakage. This preparatory work has occupied almost two years. The cement is mixed in two great mixers high on the canyon wall and dropped by gravity to the pit below. Gravel and sand are brought to the work by dredging barges hauled by tugboats.

The new structure will be 32 ft. higher than that at Roosevelt, rising 312 ft. from bedrock. It is to be of monolithic type, with an ample factor of safety. Including the electrical equipment, the estimated cost of the work will approximate $4,800,000. Work is being done directly by the association under its own engineering plans. There are 300 men now employed and it is expected to continue the work through the summer months even though conditions are very trying due to the excessive heat. It is expected that the dam will be completed in twelve months.

No Action on Boulder Dam at This Session Possible

All probability of advancing further the Boulder Dam legislation at this session of Congress vanished when the House committee on irrigation and reclamation voted to table the revised Swing-Johnson Bill. The so-called power amendments prepared by Representative Leatherwood of Utah were withheld until the time should be more propitious for their formal presentation.

The irrigation committee devoted practically all of its time at this session of Congress to the consideration of the Boulder Dam question. Finally it became clear that no agreement could be reached. This led Representative Hayden of Arizona to offer the motion to table. The vote on the motion was nine to six. Representative Leatherwood and Representative Allen, of Illinois, Republicans, joined with the seven Democratic members of the committee in supporting the Hayden motion. Those voting against the motion were: Chairman Smith of Idaho; Swing of California; Leavitt of Montana; Arentz of Nevada; Winter of Wyoming, and Davenport of New York.

Senator Johnson of California is planning to make a speech on the subject and an effort may be made to bring the bill to a vote in the Senate. It is not believed, however, that it can be passed, despite the fact it is on the calendar with a favorable report.

It is expected that some new plan will be brought forward at the next session. This may take the form of a proposal for the construction of a project by a public corporation which would construct and operate the dam and power house but would sell the output to the highest bidder.

Cowlitz Development Announced by Federal Company

Completing the purchase of land and floodage rights on the Cowlitz River, Wash., W. W. Briggs, vice-president and general manager, Gray's Harbor Railway & Light Company, Aberdeen, Wash., acting for the Federal Light & Traction Company, has announced that the way is paved for an extensive hydroelectric development which will be undertaken immediately. (Journal of Electricity, Jan. 1, 1926, p. 31.) The first unit, to develop 49,000 kw. at a cost of about $6,500,000, will be situated near Mayfield about twenty-five miles southeast of Chehalis. This portion of the development will require a dam 155 to 185 ft. high. Floodage rights extend up the Cowlitz River into Young's Canyon north of Mossy Rock. A second and third step in the complete development now contemplated will produce a total of 166,000 kw. at an estimated cost of $22,000,000.

By controling the land and floodage rights on the river the Federal Light & Traction Company holds the upper hand in the conflict still in progress for permit to develop the Mayfield site and others. Principals in this contest are the Federal interests and Backus-Brooks interests of Minneapolis, who proposed an industrial development in connection with the power project. R. K. Tiffany, state supervisor of hydraulics, Olympia, last January issued a permit to C. C. Garland, Tacoma, representing Backus-Brooks (Journal of Electricity, Feb. 1, 1926, p. 112), but an appeal was taken to the Superior Court of Lewis County by H. W. Crozier, engineer, representing the Federal company. This contest, as yet undecided legally, now is expected to be settled amicably as a result of the present announcement.

New Licenses Issued by Federal Power Commission

Licenses and permits granted recently by the Federal Power Commission include: A license to the Northwestern Power & Light Company of San Francisco, covering a development on the Elwha River in Clallam County, Wash. The plans call for a concrete arch dam 195 ft. in height, a tunnel 530 ft. long, and the installation of 12,000 kw. Power is to be fed into the company's existing system. The reservoir will provide 20,000 acre-ft. storage.

A license to the Inland Power & Light Company, of Portland, Ore., covering a project on Clearwater River near Lewiston, Idaho. The installation is to be of 10,000 kw. Full details of the project were published in the Journal of Electricity June 1, 1926, p. 547.

A license to the Livingston Mines Corporation pursuant to rights acquired by the late J. E. Walker. The project is on Big Boulder Creek in Custer County, Idaho.

A preliminary permit to Giffen, Porter, Pearsall, Freeman and Knapp, of Los Angeles. The project involved is on the North Fork of the Trinity River and the East Fork of that stream. The power is intended for use in mining operations.

A similar permit to Knight, Kay, Stone, Hall, Breeden and Wilson, of Eureka, Calif., covering a project on New River in Trinity County.

Edison Company Acquires Land Adjoining Laguna Bell Substation.—Thirty-five acres of land adjoining the Laguna Bell substation have been acquired by the Southern California Edison Company, Los Angeles, it is reported. The property is said to have been purchased in connection with the extension of the Laguna Bell substation.

Southern California Edison Company
has over
85,000 STOCKHOLDERS
1800
8000
This picture represents the number of stockholders in the Southern California Edison Company.
16,000 Workers are buying EDISON STOCK on our savings plan
Why not join them?
Safe Investment - Easy Savings Plan
Business Partnership - Good Return

Attempting to picture for the public the tremendous numbers to which its stockholder list has attained, the Southern California Edison Company uses this layout and these captions in the windows of its various offices. The original is 5 ft. long and 3 ft. 6 in. high. Busy Buttons on the left is pointing to an insignificant group of approximately 1,800 spectators in the stands at the 1925 Stanford-U.S.C. football contest as representing the number of Edison stockholders in 1917. On the right a considerably larger group, approximately 8,000, is pointed to by Busy Buttons as the number of stockholders on the company's books in 1920. The center caption then completes the story by stating that the entire number of people pictured in the stadium, 85,000, represents the number of stockholders of the Southern California Edison Company today.

Balch Tunnel East End Completed; Kings River Project Rights Granted

The east end of Balch tunnel, a part of the San Joaquin Light & Power Corporation's Kings River hydroelectric power development, recently was completed when drillers broke through the rock at the intake, according to a report issued by Harold K. Fox, chief construction engineer.

Work has been in progress on the tunnel since last September when 175 men began operations at three points on 19,500 ft. of a 12 x 12 bore to carry water from the North Fork of Kings River to Balch power house where 40,000 hp. will be developed. By working in two directions from adits or side tunnels driven into the main tunnel line, it has been possible to drive the tunnel from five breasts or headings. The completed section, which extends east 2,000 ft. from Black Rock adit will be finished with steel intake gates controlling the flow of water into the tunnel.

A total of 12,500 ft. of tunnel has been driven to date, leaving 7,000 ft. to be completed, while the power house and penstock line are in course of construction. Approximately one million pounds of high explosives are being used in the work. Foundations to carry the penstock line are nearing completion to be in readiness to carry the big high-pressure pipe. The pipe will measure 60 in. in diameter at the tunnel and taper in size to 48 in. when it will be divided into two lines of 34 in. each. The penstock line will be 4,854 ft. long and will pass under the river before entering the power house.

Six camps have been constructed to house the 450 men now at work on the Balch development, while this number will be increased this summer to approximately 700 during the peak construction period in October and November. The original plans called for completion of the Balch plant by Jan. 1, 1927, but the progress of the work has been so satisfactory it is said that the plant will be completed 30 days earlier.

Full details of the Balch plant which is estimated to cost $4.850,000, were published in the Journal of Electricity April 1, 1925, p. 241.

In connection with the Kings River development project the San Joaquin Light & Power Corporation recently has been granted by the California Division of Water Rights four permits for the diversion of water from the North Fork of the Kings River, Helms Creek, Racheria Creek and certain small tributaries. The permits call for a generation of a total of 232,613 theoretical horsepower involving the estimated expenditure of $42,300,000 in the construction of additional power houses and enlargement of power plants now under construction.

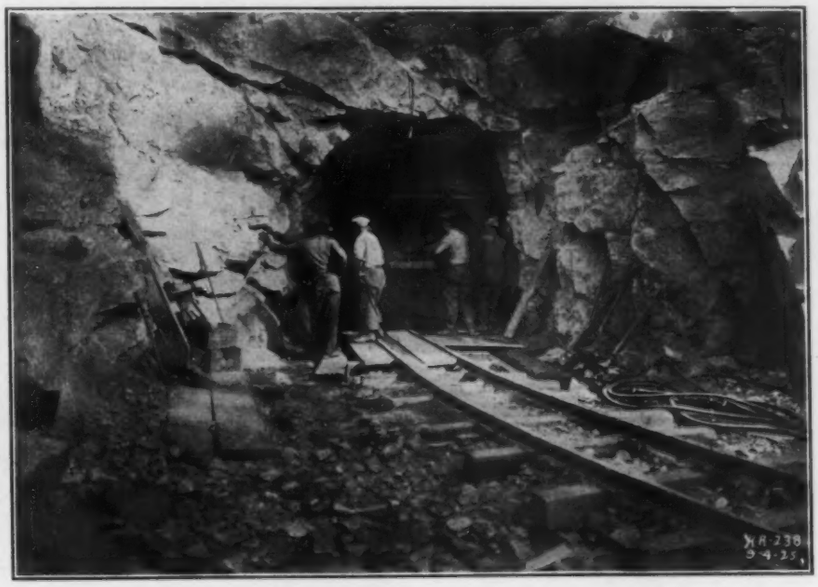
Storage also was applied for in some of the applications filed by the corporation, but approval of storage features has been withheld for the protection of agricultural interests in view of the great variability of the flow of the Kings River. (Journal of Electricity, Jan. 1, 1926, p. 28.) The permit directs that the flow of the river shall be maintained at all times so that it will be at substantially the same rate as if the diversion and contemplated use were not availed of.

New 15,000-kw. Steam Unit for Pasadena Recommended

Construction of a 15,000-kw. steam generating unit for the Municipal Light and Power Department of Pasadena, Calif., is recommended in the budget for 1927 which has just been filed by Benjamin F. Delanty, general manager. The plant addition will cost $750,000, including the turbine, a 1,000-hp. boiler, condenser and necessary fittings. Mr. Delanty has estimated that the plant will cost $50 per kw.

New meters are being installed at the rate of 2,000 per year, which makes it necessary to increase the capacity of the present plant. In his recommendations Mr. Delanty urges that the new addition be ordered early in 1927 and, as it will require nine or ten months to make and install the equipment, at least 18 months must elapse before the unit will be ready for operation. The present plant has a capacity of 18,000 kw.

The recommendations also include the rebuilding of the Lamanda Park substation. This station is in a rapidly growing section of the city and is carrying a capacity load of 3,000 kw. at the present time, which makes it essential that provision for handling this growing load be made immediately.



Starting the first adit of the Balch tunnel, a part of the San Joaquin Light & Power Corporation's Kings River project. Work was begun in September, 1925.

Cities' Application for Water Rights Before Commission

Favorable action by the Federal Power Commission on the application of the East Bay cities for rights on the Mokelumne River in California (Journal of Electricity, May 15, 1926, p. 491), is foreshadowed by the receipt of a favorable report on the project from the engineers who made the field examination. The principal purpose of the project is to provide storage for the municipal water supply, but a power development of 12,000 hp. is planned also.

Objections to the project have been filed by the California Reclamation Board and land-owners in the delta of the Sacramento River. The Reclamation Board is insisting that the Lancha Plana reservoir should be adapted to flood control. No engineering data to support this contention, however, have been received.

The farmers on the lower Sacramento fear further encroachment of salt water on their lands if the flow of fresh water is reduced. The amount diverted, however, is regarded by the engineers as insufficient to have any bearing on the salt-water situation.

New Wynooche Project Estimate Is Set at $2,000,000

In a report to the city council of Aberdeen, Wash., on the Wynooche power project which the city proposed to develop, W. J. Roberts, consulting engineer of Tacoma, Wash., places an estimate of $2,000,000 as the probable cost of such an enterprise. He claims this amount will develop between 12,000 and 15,000 hp. He states that the Weatherwax storage basin at an elevation of 700 ft. has storage capacity of 200,000 acre-ft., and to effect this storage a dam approximately 240 ft. in height would be required. The basin would cover about 2,600 acres.

Mr. Roberts was employed by the city council to make a report on the Wynooche project after the findings of Stevens & Koon, consulting engineers of Portland, had been rejected by that body. (Journal of Electricity, May 15, p. 493.)

An ordinance proposing the issuance of $2,000,000 in bonds for the development of the Wynooche project has been passed by the city council. June 29, 1926, is the date set for a special election at which the people will have the opportunity to express themselves for or against the project.

Engineer Reports on Oakland's Proposed Water Projects

That the Upper Mokelumne water and power project as proposed by the Citizens' Water Committee of Oakland, Calif., will not furnish water any cheaper than the Lancha Plana project on which the East Bay Municipal Utility District is at present engaged is the opinion of a report prepared for the Oakland Chamber of Commerce by Lester S. Ready, chief engineer, California Railroad Commission.

According to Mr. Ready's report, the Lancha Plana project will require an initial expenditure of $32,102,000 for the first step to be completed by 1930 and a total capital expenditure of $65,852,000 by 1966 to provide for the full capacity of 200,000,000 gallons daily. Power production at the Lancha Plana dam from a 7,000-kw. plant will be sufficient to supply all pumping requirements until 1954.

The Upper Mokelumne project would require 300,000 acre-ft. of storage to provide the 200,000,000 gallons daily in place of the 222,000 acre-ft. at the Lancha Plana dam. This project would require an initial capital expenditure of $32,896,000 and a total capital expenditure of $110,410,000. Power production on the upper project could not begin before 1946 when 86,000 kw. could be installed in five plants.

In addition, the upper project is in conflict with certain rights acquired by the Pacific Gas and Electric Company from W. S. Preston, Jr. The plans of the power company call for the installation of a 42,000-kw. plant at Tiger Creek on the Mokelumne River and an increase in the capacity of the present Electra plant from 20,000 kw. to 50,000 kw. or more. (Journal of Electricity, Feb. 15, 1926, p. 157.) Present plans call for these installations by 1930. Both of these developments would be beneficial to the Lancha Plana project and neither would be possible if the Upper Mokelumne project was developed.

The report goes into considerable detail as to comparative costs.

Short Course for Metermen Held by Colorado University

The fourth annual short course for metermen recently held at the University of Colorado, Boulder, drew an attendance of thirty-five, of whom twenty-five were connected directly with the electrical industry in Colorado and Nebraska. The course was held under the auspices of the extension division of the University of Colorado and under the direct supervision of Prof. C. M. McCormick, in charge of the standardizing laboratory of the school.

The instruction continued over a period of three days and included addresses on a variety of phases related to the general subject. Speakers were drawn from the electrical industry in the region and from the faculty of the university.

Aside from routine work, those attending heard an illustrated address on the Moffat tunnel by Clifford A. Betts, office engineer, and were piloted through the new Valmont steam generation plant of the Public Service Company of Colorado by H. H. Kerr, electric superintendent of that company. A banquet was tendered on the evening of the second day through the courtesy of the Sangamo Electric Company and the Westinghouse Electric and Manufacturing Company.

Power Project Planned on Clearwater River, Oregon.—The Inland Power & Light Company, of Portland, Ore., has applied for a license covering a power project on Clearwater River near Lewiston, Ore. It is proposed to build a concrete spillway diversion dam 925 ft. long with a tailrace 4,500 ft. long. One 7,000-hp. turbine is to be installed.

P.C.E.A. Holds Meter Short Course at "Cal. Tech."

First annual short course for metermen to be held in southern California under the auspices of the educational subcommittee of the meter committee, P.C.E.A., was held at California Institute of Technology, Pasadena, this spring. There were thirty-six metermen in attendance at the meetings, representing all of the electric utilities of southern California.

R. W. Sorenson, professor of electrical engineering at "Cal. Tech.", not only supervised the instructional course but took an active part in the lectures and demonstrations. Classes were in session from 8 a.m. until 5 p.m. each of the five days of the session. An excursion to the test departments of the Southern California Edison Company and of the Los Angeles Bureau of Power and Light was made the sixth day. The course included both lectures on the theory of the different meters and laboratory experiments dealing with the practical side of metering.

The course was adjudged a great success. A similar course was conducted later at the University of California, Berkeley.

The territory served by the P.C.E.A. is so large that it worked out much better to have these two courses than to have only one for both sections of the state. Last year, with only one course at Berkeley, the total attendance was forty-nine. This year the Berkeley course attendance was thirty-three and that at Los Angeles thirty-six, making a total for the two of sixty-nine, a 48-per-cent increase in attendance over the previous year.

A.I.E.E. News

A.I.E.E. Chooses New President at Annual Election

Cummings C. Chesney, manager and chief engineer, General Electric Company, Pittsfield, Mass., was elected president of the American Institute of Electrical Engineers at the annual business meeting held in the Engineering Societies Building, New York, May 21. Other officers elected were: vice-president—H. M. Hobart, Schenectady, N. Y.; George L. Knight, Brooklyn, N. Y.; B. G. Jamieson, Chicago, Ill.; A. E. Bettis, Kansas City, Mo.; H. H. Schoolfield, Portland, Ore.; managers—F. J. Chesterman, Pittsburgh, Pa.; H. C. Don Carlos, Toronto, Ont.; I. E. Moultrop, Boston, Mass.; treasurer—George A. Hamilton, Elizabeth, N. J. (re-elected).

These officers, together with the following hold-over officers, will constitute the board of directors for the next administrative year, beginning Aug. 1: M. I. Pupin, New York; Farley Osgood, New York; P. M. Downing, San Francisco, Calif.; Herbert S. Sands, Denver, Colo.; W. E. Mitchell, Birmingham, Ala.; Arthur G. Pierce, Cleveland, Ohio; W. P. Dobson, Toronto, Ont.; W. M. McConahey, Sharon, Pa.; W. K. Vanderpoel, New York; H. P. Charlesworth, New York; John B. Whitehead, Baltimore, Md.; J. M. Bryant, Austin, Tex.; E. B. Merriam, Schenectady, N. Y.; M. M. Fowler, Chicago, Ill.; H. A. Kidder, New York; E. C. Stone, Pittsburgh, Pa.

Vancouver Section Holds Annual Meeting.—At the annual meeting of the Vancouver Section, held at the University Club June 1, the following officers were elected: chairman—R. L. Hall; secretary—C. W. Colvin; executive committee—A. Vilstrup, C. N. Beebe and A. C. R. Yuill.

The men who took the short course for metermen given at the California Institute of Technology under the auspices of the P.C.E.A.

News Briefs

Great Western Would Study Silver Creek Project.—Offering to make a study of the Silver Creek project for the purpose of making the Sacramento Municipal Utility District an offer for the power to be developed on that river in connection with the district's water project, or an offer for the lease of the water, the Great Western Power Company is preparing to send engineers to study the records of the district and make surveys of the project, according to press dispatches. The action is said to be the outgrowth of a conference between W. G. B. Euler, general superintendent, C. M. Mardel, chief engineer of the company, and R. L. Jones, Ben Leonard and Albert Elkus, directors of the district. The Pacific Gas and Electric Company also has started a survey for the same purpose. The offers made will determine the course of development of the project, it is stated. In case of lease to either company, with the company building its own plant, contract will be required permitting the district to take over the plants at the end of a 23-year period at their cost, it is provided.

First Exhibition of Talking Film Made at N.E.L.A. Convention.—A talking film based on a comprehensive scenario prepared by Ray D. Lillibridge, Incorporated, to show the advantages of Servel electric refrigeration was presented at the recent N.E.L.A. convention. As the observers watched the moving picture they heard at the same time the words of the salesman explaining the various advantages of the refrigerator. The exhibition was the first practical application of phono-films, the invention of Dr. Lee DeForest, and also the pioneer showing of colored animation.

Power Project for West Fork of Miller River, Washington.—Application has been filed with the supervisor of hydraulics of Washington by E. A. Olson and W. T. Batcheller, both of Seattle, for permission to divert 260 sec.-ft. of water from the West Fork of the Miller River at a point a few miles south of Skyomish. The water is to be used in the generation of 10,300 continuous electrical horsepower and the cost of the power plant is estimated at $1,300,000. The project includes the erection of a 100-ft. dam to impound 45,000 acre-ft. of water, the reservoir to be raised around the present Dorothy Lake.

Denver Applies for Water Rights on South Platte River.—The City and County of Denver have applied to the Federal Power Commission for a preliminary permit covering a project on the South Platte River to provide water for municipal use and to develop power. The development includes six reservoirs with a total capacity of 443,200 acre-ft. It is proposed to build a power house at each reservoir, the total amount of power to be developed to be 59,250 kw.

Company Negotiates for Hydroelectric Plant of Duncan, Vancouver Island.—The International Utilities Corporation of New York is negotiating with the city of Duncan on Vancouver Island for the acquirement of the city's hydroelectric plant, and for a 20-year franchise for the distribution and sale of electric current within the city limits, at the end of the 20-year period the city either to grant an extension to the company or to take over the plant at a valuation. At a recent meeting of the city council it was decided to ask the International company to appoint a representative to confer with the city's electric light committee on details of the company's offer.

Two Wyoming Utilities Sold.—The electric light and power systems at Lovell and Newcastle, Wyo., recently have been purchased by the Midwestern Power Company, Salt Lake City. Lovell is in the northern end of the Big Horn basin and is about thirty-seven miles from Greybull, where the Midwestern Power Company for some time has owned the electric system. Newcastle is the county seat of Weston County and is located about forty-five miles from Edgemont, S. D., where the Midwestern Power Company already has a plant.

Recently completed quarters for the electrical distribution department of the Los Angeles Gas and Electric Corporation. The outside dimensions of the building are 230 x 65 ft. It has been so constructed as to permit of the addition of another story should this become necessary. In the rear of the building four open-sided sheds offer protection for approximately 200 automobiles. A loading platform extends the full length of the building in the rear.

Discovery May Affect Electric Trucks.—The report of the discovery of a new element making possible lighter storage batteries, coming from Vienna, Austria, may have an effect upon future transportation by means of electric trucks, it is pointed out in a recent issue of the Journal of the A.I.E.E. When perfected for commercial uses the new element would provide lighter storage batteries, for the new element is one-fifth the weight of lead and is said to surpass the lead accumulators now used in storage batteries in both capacity and power.

Ojai Irrigation District Applies for Water for Power Development.—Trustees of the proposed Ojai Irrigation District have asked authority to use 30,800 ft. of water per annum from Sespe Creek in Ventura County. The stream is a tributary of the Santa Clara River. With an expenditure of $2,060,000 the trustees estimate the proposed district would be able to develop 6,818 hp.

Building Program of Westinghouse Company $5,000,000.—An expenditure of more than five million dollars is involved in the building program planned by the Westinghouse Electric & Manufacturing Company, East Pittsburgh. The structures now under construction include a new general office building at the East Pittsburgh works, a four-story office, warehouse and service station building in Detroit, a cement pole plant in St. Louis for the George Cutter organization of the Westinghouse interests, and a two-story office building in Derry, Pa. Plans have been approved for the construction of a $500,000 storehouse at Mansfield, Ohio, and for additional buildings at the works at East Springfield, Mass., while plans are being prepared for construction work at Sharon, Pa., that will entail a cost of $275,000.

Great Northern Railway Applies for Washington Water Rights.—In preparation for the electrification of its western lines the Great Northern Railway, through its vice-president, C. A. Jenks, recently filed application with the office of the state supervisor of hydraulics at Olympia, Wash., to appropriate 80 sec.-ft. of water from Deception Creek, a tributary of the Tye River. The water is to be used in an electrical development project to be located southwest of Scenic in the Cascade Range, whereby the railway hopes to generate 11,400 hp. under a head of 1,350 ft. A concrete dam 800 ft. long will form a reservoir with a capacity of 2,000 acre-ft.

Students Visit Edison Company's Power Project.—Twenty-one seniors in the civil engineering course at the California Institute of Technology, with Prof. Franklin Thomas, Prof. George Forster, Walter Ogier and F. W. Maxstadt, of the departments of civil, mechanical and electrical engineering, recently spent five days as the guests of the Southern California Edison Company at the company's hydroelectric project on the San Joaquin and Big Creek Rivers. During the trip the party visited the Stevenson Creek experimental arch dam which is located within the territory covered by the Edison company's construction activities.

Ogden's Street Lights to Be Increased 49 Per Cent.—A contract has just been closed between the city of Ogden and the Utah Power & Light Company whereby the city of Ogden will receive an increase of 49 per cent in street lights throughout the residential and business sections. With the exception of the large arc lights in the downtown sections all arcs are to give way to the incandescent type of lamp. The new contract covers a three-year period.

Utah Utility Extends Its Lines.—The Utah Power & Light Company is extending its lines to serve the town of Castle Dale, Utah. This town formerly was served by a privately owned small local plant. Hitherto Huntington has been the southern terminal of the Utah Power & Light Company's territory, but this new extension, which also includes several other small towns in the coal fields, will bring the company's lines several miles further south.

News of the Electragists

Many Plan to Attend Meeting of Electragists in San Diego

Reservations for the quarterly meeting of the California Electragists, Southern Division, have been received in large numbers from all parts of southern California, according to C. J. Geisbush, executive secretary. The convention will be held at the Hotel San Diego, San Diego, on Saturday, June 26.

Plans have been made for a very instructive program, which will include reports of the work which has been done by the merchandising committee and the estimating section. Meetings of the convention will be held in the sun room of the Hotel San Diego.

The Ruth Alexander, carrying delegates from the immediate vicinity of Los Angeles, will leave Los Angeles Harbor Friday, June 25 at 7:30 p.m. Dancing and other entertainment will be provided following dinner. The boat will arrive in San Diego Saturday morning about eight o'clock.

A banquet and ball will be held at the Hotel San Diego Saturday night. By special arrangement with the Pacific Steamship Company delegates returning on the Ruth Alexander will not have to leave the hotel until 11:30 p.m. Saturday for the return voyage to Los Angeles.

Inspectors Extended Courtesy Membership by Electragists

Believing that the standards of the National Electrical Code and the Safety Orders of the Industrial Accident Commission of Califoria best can be enforced by complete co-ordination of effort between the Electragists and the municipal electrical inspectors, the California Electragists, Southern Division, have extended a courtesy membership in their organization to municipal electrical inspectors in southern California.

The California Electragists are striving to build up and maintain high standards of quality in workmanship and materials within the electrical industry so that the public may be better served. The electrical inspectors are interested in enforcing the standards which are effective at the present time. It is felt that the closer cooperation which will exist between the two groups through their contact in the organization will be mutually beneficial.

Pasadena Electragists Elect Officers.—New officers of the Pasadena branch of the California Electragists, Southern Division, have been elected for the year as follows: president—**J. B. Morgan**; vice-president—**C. A. Rowley**, The McNally Company; secretary—**H. W. Barnes**, Barnes Brothers; and treasurer—**R. H. McCormick**, McCormick Electric Shop.

Everett Weant of Cline's Electric Shop, San Luis Obispo, Calif., was a recent visitor in Los Angeles.

Electrical Council, Underwriters' Laboratories Meets in Chicago

The sixth meeting of the Electrical Council of the Underwriters' Laboratories was held at the principal offices and testing station, in Chicago May 25-26. Thirty-five of the forty-five members of the council were present, having come from all parts of the United States and Canada. Western men in attendance at this meeting included Claude W. Mitchell, Board of Fire Underwriters of the Pacific, R. J. Larrabee, Underwriters' Laboratories, both of San Francisco; and Harry N. Beecher, chief electrical inspector, Los Angeles.

C. W. Jones, treasurer of the Southern Division of the California Electragists. Mr. Jones is proprietor of the Pomona Fixture and Wiring Company of Pomona, Calif.

During the sessions there was discussion of a wide variety of electrical appliances and materials and their relation to fire and accident hazards. A considerable amount of time during the sessions was devoted to a discussion of requirements for non-metallic sheathed cable and to the discussion of proposed changes in requirements for older wiring materials.

The Lynwood Electric Company, F. A. Lampe, proprietor, has moved into a new store at 203 N. Long Beach Boulevard, Lynwood.

Don Conover, formerly with the **Myers Electric Company**, Los Angeles, has been appointed sales manager of the **Woodill-Hulse Electric Company**, of that city.

J. R. Wilson, formerly with the **Los Angeles Electric Works**, has resigned to become connected with the **Quality Electric Company** of Los Angeles.

Book Reviews

THE AMERICAN YEAR BOOK

A Record of Events and Progress for the Year 1925

Edited by Albert Bushnell Hart and William Schuyler and containing contributions from 270 distinguished editors, educators, university heads, federal authorities, scientific directors, technical experts and business leaders. In eight classifications, with 360 sections, carefully indexed and convenient in size. Published by The MacMillan Company, New York, for the American Year Book Corporation, which represents 45 constituent societies. $7.50.

Published for the first time since 1919, the reappearance of the American Year Book, for 1925, will be welcomed by all who have used the work previously and by those who become initiated into its broad cultural as well as practical usefulness in the present edition.

The remarkable thing about the book is its complete ramification into all phases of American life and activity, and the fact that its surveys of the year's progress are written by the foremost authorities on the subjects.

From the electrical industry standpoint it contains valuable and searching treatments of questions of public resources and public work, public services and utilities, taxation, economic and business conditions, engineering and construction and other subjects of interest to individuals for their own particular interest.

Every device to make the work one to which easy reference may be made has been incorporated in its indexing, its typographical and content arrangement. Statistics, analyses, and bibliography are selected for their conciseness and grasp.

Aside from its technical, economic, governmental, scientific or social content, there is recorded the advances in the humanities, the arts and letters of America for the year.—W.A.C.

N.E.L.A. Serial Reports.—Two more serial reports of the prime movers committee, Technical National Section, now are available. One of these deals with Specifications, the object being to formulate general specifications for the major items of power-plant equipment. This is designed to be of service to the specification writer. The second of the reports covers Distillation Products of Coal. This is largely a brief review of leading processes for the low-temperature carbonization of coal and allied processes. The utility of these processes as sources of suitable fuels is discussed. The price to members is 15 and 25 cents, repectively.

Heat Transmission Lecture Printed.—A printed lecture containing data on heat transmission through heated walls and formulas for the determination of heat losses through various kinds of walls may be had from the publishers, **Celite Products Company, New York. Bulletin No. 131.**

Meetings

Pacific Coast Electrical Supply Jobbers Meet at Del Monte

The quarterly meeting of the Pacific Coast Electrical Supply Jobbers' Association took place at Del Monte, Calif., May 12-14. In accordance with the organization's usual custom, closed sessions were held in the mornings of the first three days, presided over by O. B. Stubbs, president. On the evening of Friday, the 14th, an open meeting was held at which Eugene G. McCann, president of the San Francisco Electrical Development League, delivered an interesting and informative address on the function of the league and its value to the electrical industry, followed by an animated discussion of the various matters brought out by Mr. McCann.

The open meeting on Saturday morning, the 15th, was devoted to a report on the progress of the Red Seal movement now being conducted on a statewide basis in California by the California Electrical Bureau. C. T. Hutchinson, chairman of the advisory committee of the bureau, who delivered the address, gave a general report on the organization plans of the bureau, described in detail the routine involved in the administration of the Red Seal plan, touched upon the financial affairs, and reported thirty-three Red Seal homes as the result of the first month's work, forty-eight for the second, and seventy-one for the third. H. L. Harper, C. E. Listenwalter, W. S. Berry and a number of others participated in the discussion that followed.

The annual golf tournament was held Friday and Saturday in the afternoon, and D. E. Harris, president of the Pacific States Electric Company, distinguished himself by achieving the lowest net score, thereby attaining the honor of having his name inscribed upon the famous Copper Cup.

A number of members from outside the state attended the meeting.

Southern California Refrigerator Distributors Organize

Distributors of six electrical refrigerator manufacturers and a number of power-company representatives met recently in Los Angeles to consider the development of electrical refrigeration in southern California. More than thirty were in attendance.

The meeting was called at the request of J. Robert Crouse who explained the organization of the distributors that has been formed in Cleveland and also the National Refrigeration Manufacturers Council, of which Mr. Crouse was a founder. Mr. Crouse is also vice-president of the Electric Refrigeration Corporation.

After thoroughly explaining the Eastern organization, Mr. Crouse suggested that a similar organization be formed to cover southern California, and it was agreed by those present that there is a need for a similar organization in Los Angeles. An organization committee for the purpose of forming such an organization was appointed. The committee consists of W. F. Brainerd, California Electrical Bureau, chairman; L. D. Robertson, Kelvinator Company; A. L. Spring, Servel Company; Ivan de Jongh, Frigidaire Company, and representatives of three power companies to be chosen later.

Salt Lake Electrical Men Hold Annual Golf Tournament.—The annual golf tournament for the 1926 season for members of the electrical industry in Salt Lake City is now under way. This tournament, which is under the auspices of the Rocky Mountain Electrical Co-operative League of Salt Lake City, is being conducted in four legs, one each in May, June, July and August. The winners of the four monthly tournaments will compete during early September for the championship of the electrical industry. Suitable prizes will be awarded to the winner of each monthly tournament and for the winner of the tournament. An entrance fee of $1 is charged, and the money so collected will be used in the purchase of prizes for the tournament. A large number of participants are entered.

COMING EVENTS

California Electragists, Southern Division—
Quarterly Convention
Hotel San Diego, San Diego, Calif.
June 26, 1926

Northwest Electric Light and Power Association —
Annual Convention—Spokane, Wash.
June 14-17, 1926

American Society of Agricultural Engineers—
Annual Convention—Tahoe Tavern,
Lake Tahoe, Calif.
June 23-26, 1926

American Institute of Electrical Engineers—
Convention—White Sulphur Springs, W. Va.
June 21-25, 1926

Association of Electragists, International—
Annual Convention—Cedar Point-on-Lake-Erie, Sandusky, Ohio
Headquarters—The Breakers
Aug. 24-27, 1926

American Institute Electrical Engineers—
Pacific Coast Convention, Salt Lake City, Utah
Sept. 7-10, 1926

California Electragists—
Annual State-wide Meeting—Hotel Del Monte
Del Monte, Calif.
Oct. 1-3, 1926

Washington Water Power Company Men Golf Winners.—B. C. Childs of the commercial department of The Washington Water Power Company was winner of a blind hole tournament held by employees of that company at the Hayden Lake golf course on May 1 in which eighteen central station men and jobbers took part. In a special event of 54 holes, played on three courses around Spokane. J. E. E. Royer and R. B. McElroy of The Washington Water Power Company defeated R. O. Bremmer of the Pacific States Electric Company and J. P. Carson of the Graybar Electric Company 12 up. The final 18 holes was played at the W.W.P. tournament.

Red Seal Play Big Success at San Diego Electric Club

An unusually successful presentation of the Red Seal Plan was given before a large gathering of architects, electrical and building contractors when the San Diego Electric Club recently presented "Standards," a one-act comedy drama written and directed by G. H. P. Dellmann, lighting sales engineer of the San Diego Consolidated Gas and Electric Company. Preceding the play a luncheon was served. Each member of the club brought one or more architects as guests, the total attendance being approximately two hundred. As announced on the program, the playlet was "dedicated to all architects, builders, electrical contractors and home-owners," and was received enthusiastically.

Scene from the playlet "Standards," as presented by the San Diego Electric Club. Left to right—A. Reynolds, as Hadley, the Architect; Ruth Creveling as Mrs. Hadley; K. Lyons as Bill Brown, Electragist; and P. Adams, as Mr. Hathaway of the California Electrical Bureau.

"Standards" was written with the sole object in view of presenting the Red Seal Plan in a concise and interesting manner; its success has convinced the San Diego Electric Club that a playlet of this character makes a more distinct impression than a speech embodying the same subject matter.

The stage was set as a modern kitchenette, including electric range, convenience outlets, kitchen daylight unit, and similar equipment, thus making a particularly appropriate setting for the story of adequate house-wiring. The play centers around the dejection of John Hadley, architect, because of trials incident to lack of standardization. Later on his brother-in-law, an electrical contractor, tells of his struggles along the same line, showing the unprofitable and unnecessarily destructive competition between electrical men. At just the right time Mr. Hathaway of the California Electrical Bureau comes to call and convinces both the architect and the electrical contractor that the Red Seal Plan is the only logical solution of their problem. Most of the comedy lines are introduced by Jane Hadley, wife of the architect.

The cast of the play as given in San Diego was as follows: Jane Hadley, wife of John Hadley, played by Ruth E. Creveling; John Hadley, architect, Alexander Reynolds, Jr.; Bill Brown, brother of Jane, Kenneth Lyons; Mr. Hathaway of the California Electrical Bureau, Percy Adams.

At the conclusion of the play W. F. Brainerd, of the California Electrical Bureau, addressed the club and its guests on "What the Red Seal Means."

The play was repeated early in June before the San Diego Realty Board.

Personals

J. P. Jollyman, chief, division of hydroelectric and transmission engineering, engineering department, Pacific Gas and Electric Company, San Francisco, recently returned from Princeton University where he delivered a lecture under the Cyrus Fogg Brackett

J. P. JOLLYMAN

Lectureship. Mr. Jollyman, who spoke on "Electric Transmission of Power," was the second lecturer from the Pacific Coast under that lectureship, the first having been the late John A. Britton, who delivered a lecture on "Public Utility Development on the Pacfic Coast" in April, 1922. Since 1920 Mr. Jollyman has had charge of the design of the hydraulic and electrical installations of the hydroelectric plants, the electrical features of the high-tension transmission lines, and of the connected substations of the Pacific Gas and Electric Company. Some of the more important projects recently undertaken have been Pit River Power House No. 3, 81,000-kva. capacity, operating at 220 kv.; the 30-mile extension of the 220-kv. line from Vaca-Dixon substation to Contra Costa substation near Antioch, this line containing the first long-span construction for 220 kv., the extension of Vaca-Dixon substation to 150,000-kva. capacity; and the construction of Shasta, Contra Costa, 50th Avenue, Oakland, and Martin substations. A graduate of Stanford University with the class of 1903, Mr. Jollyman entered the employ of the California Gas & Electric Corporation, predecessor of the Pacific Gas and Electric Company, and remained until 1909 when he joined the Great Western Power Company's organization. Mr. Jollyman was in charge of that company's Big Bend power house and the changing over of the transmission line from 60,000 to 100,000 volts. In 1911 he returned to the Pacific Gas and Electric Company as engineer of electrical construction.

S. B. Gregory, Western manager, Arrow Electric Company, with headquarters in San Francisco, is making a trip to Hartford, Conn., to attend the company's annual sales conference held at the factory. He is accompanied by **Carl G. Sachs,** Los Angeles representative.

G. G. Thompson, formerly with the Ward-Leonard Electric Company, New York, now is vice-president of the Safety Electric Products Company, Inc., Los Angeles. Mr. Thompson is in charge of the latter company's newly opened office in San Francisco.

Frank M. Harris, chief of the bureau of specifications and estimates, engineering department, Pacific Gas and Electric Company, San Francisco, received the Harriet Billings prize which was awarded at the N.E.L.A. convention. The prize, a cash award of $50, was donated by **Arthur Williams,** vice-president, The New York Edison Company, in recognition of Miss Billings' services to the National Electric Light Association as secretary in its early days, for the second best paper on any subject relating to the electric light and power industry.

W. F. Brainerd, of the California Electrical Bureau in Los Angeles, has been made chairman of a committee appointed at a recent meeting of electrical refrigerator distributors and power-company representatives in that city to form an organization of electrical refrigerator distributors in southern California. **L. D. Robertson,** Kelvinator Company; **A. L. Spring,** Sérvel Company, and **Ivan de Jongh,** Frigidaire Company, are other members of the committee.

Guy W. Talbot, president, **L. A. McArthur,** vice-president and general manager, and **Mrs. McArthur,** and **M. J. Wilkinson,** assistant secretary and assistant treasurer, Pacific Power & Light Company; **S. E. Skelley,** manager investment department, Pacific Power & Light Company and Northwestern Electric Company; **L. T. Merwin,** vice-president and general manager, Northwestern Electric Company; and **W. P. Strandborg,** director of publicity, Portland Electric Power Company, represented the Portland power companies at the N.E.L.A. convention.

Virgil E. Stone, of the budget department of the Public Service Company of Colorado, and a lieutenant in the Colorado air squadron, recently flew from Denver to Little Rock, Ark., to attend the air meet and elimination races held at that place.

H. H. Schoolfield, chief engineer, Pacific Power & Light Company, Portland, Ore., has been elected a vice-president of the American Institute of Electrical Engineers. **P. M. Downing,** vice-president in charge of electrical construction and operation, Pacific Gas and Electric Company, San Francisco, holds over as a member of the board of directors for the ensuing year.

William C. King, for four years in the power sales department of the Los Angeles Bureau of Power and Light, has joined the staff of the Thomas Machinery Company in that city.

Richard E. Smith, publicity manager, Southern California Edison Company, was guest speaker at a recent luncheon of the Electric Club of San Diego. Mr. Smith was a delegate to the eleventh annual conference, second district Rotary, in that city.

George A. Kieffer, formerly with the American Purchase & Sales Corporation, San Francisco, and prior to that time salesman for the Manning-Bowman Company, has established himself as manufacturers' agent in that city representing the Roach Appleton Manufacturing Company of Chicago.

Morris L. Foster, commercial agent, and **William Evans,** salesman, Santa Cruz, Calif.; **O. A. Brugler,** agent, and **C. G. Glascoe,** salesman, Watsonville; **E. D. Murray,** agent, and **Charles O. Phillips,** salesman, Hollister; **R. G. Barnett,** agent, and **G. B. Andrews,** salesman, Gilroy, all members of the Coast Counties Gas & Electric Company's organization, attended a two-day conference on electric refrigeration and air and water heating held recently in San Francisco.

Walter G. Blossom, field superintendent of education for the Southern California Edison Company, recently addressed a meeting of the Junior Chamber of Commerce of San Diego on the subject of "The Romance of Electricity." His talk was illustrated by means of moving pictures of various hydroelectric projects.

L. A. Barley, chief engineer, Mountain States Inspection Bureau, addressed the contractors and municipal light department employees of Colorado Springs, Colo., at their first get-together meeting there. **Matt Whitney,** prominent Colorado Springs electragist, arranged the meeting and served as chairman.

Robert S. Prussia, district illuminating engineer and salesman for the Westinghouse Lamp Company, San Francisco division, was elected president of the Oakland Electric Club at its annual meeting recently. A native of California, Mr. Prussia received his education in Sonoma County and except for a few years as representative for a typewriter concern, has lived and worked in California. He entered the lamp-making industry in 1915 with the National Lamp Works but soon became associated with the Westinghouse Lamp Company, with which he has been connected ever since. Always deeply interested in illuminating engineering, he was active in the found-

ROBERT S. PRUSSIA

ing of the Bay Cities Chapter of the Illuminating Engineering Society and was one of its first directors. Mr. Prussia was one of a committee of five men who were asked to draw up the industrial lighting code for the State of California. He was chairman of the lighting committee, Commercial Section of the Pacific Coast Electrical Association, in 1923, and has been a member of the committee since. Mr. Prussia now is planning the illumination for the Nevada Transcontinental Highway Exposition to be held at Reno, Nev., in 1927.

Otto Reiman and **L. E. Clark**, of the Reiman Wholesale Electric Company, Los Angeles, have purchased the stock in that company formerly held by **J. S. Marks**, formerly treasurer of the company, who is retiring to attend to private interests. **M. P. Shupe** has been added to the firm's sales force.

J. R. Broughton, for several years store salesman for the Graham-Reynolds Electric Company, Los Angeles, has joined the sales force of Garnett Young & Company in that city.

William Morrell has been appointed Los Angeles representative of the George A. Gray Company, Pacific Coast manufacturers' agent.

Harry Fife, formerly a member of the Reiman Wholesale Electric Company's organization, Los Angeles, has become affiliated with the sales force of the Illinois Electric Company of that city.

A. M. Frost, sales manager, San Joaquin Light & Power Corporation, Fresno, Calif., has been awarded third prize as geographic chairman, Pacific Coast Division, National Industrial Lighting Activity. The campaign was conducted under the auspices of the Industrial Lighting Committee of the National Electric Light Association from Sept. 1, 1925, to March 1, 1926, and Mr. Frost won his prize for making one of the best and most complete reports of what had beeen accomplished during that period in the territorial division of which he was chairman. Mr. Frost has been connected with the San Joaquin Light & Power Corporation for about fifteen years, having entered its employ in 1911 as manager of the Paso Robles district. From there he was transferred to Santa Maria as manager, remaining until 1914, when he was made manager at Selma. Six years later he went into business for himself selling and installing electric pumping plants,

A. M. FROST

giving it up a year or so after to become manager of the San Joaquin company's Fresno district. In 1922 he was appointed to a newly created position of sales manager in charge of the company's selling program as regards new business. Mr. Frost is well known in Pacific Coast electrical circles and has taken an active part in affairs of the industry. Among other activities he has served as chairman of the Commercial Section, P.C.E.A., and at the present time he is a member of the executive committee of that section.

William E. Barrett, head of the publicity department of the Westinghouse company in the Mountain region, has been transferred from Denver to the St. Louis office of the company. **Melvin E. Lanning**, merchandise specialist on the Denver staff, is on special duty in the Salt Lake office of the Westinghouse company and his place has been taken temporarily by **E. D. Regan**, recently transferred back to Denver from Mansfield, Ohio. **J. E. Perdue** is the new district manager of the Westinghouse Lamp Company in Denver, recently having been transferred there from Kansas City, Mo., as successor to **L. J. Bridger** who now is engaged on valuation work for the city in connection with the central station franchise in Denver.

Sam Hall, of the Electric Supplies Distributing Company, San Diego, Calif., paid a visit to Los Angeles a short while ago.

Richard Hall, manager, Illinois Electric Company, Los Angeles, returned a short while ago from a short business trip East.

Frank Yerkes, Carl Luscombe, A. L. Hagerman, Edwin Wagner, G. C. Chipman, W. C. Sterne, Tom Gray, Frank R. Jamison, E. L. Siekman, F. G. Barnett, C. H. Kelliher, E. K. Hartzell, C. J. Hancock, F. S. Henderson, A. A. Newton, J. G. Keegan and **L. W. Cody** were among those who attended the recent meeting of the district managers of the Public Service Company of Colorado. Officials of the company in attendance were **Guy W. Faller**, vice-president; **C. N. Stannard**, vice-president and general manager; **H. T. Hughes**, treasurer; **V. L. Board**, general superintendent, and **J. E. Loiseau**, secretary.

H. E. Sanderson, Pacific Coast manager, Bryant Electric Company, has returned to San Francisco from Bridgeport, Conn., where he attended a sales conference at the factory.

D. E. Harris, president, Pacific States Electric Company, San Francisco, had the low net score in the golf tournament at Del Monte, Calif., during the session of the Pacific Coast Electrical Supply Jobbers Association. This entitles him to have his name engraved on the famous Copper Cup.

V. Howard Wattles has been appointed distributor in northern California for the Universal Cooler Company, Detroit, Mich. Mr. Wattles is returning to the Pacific Coast after an absence of twenty-four years.

Grover Anderson, manager, J. G. Pomeroy Company, San Francisco, made a trip to Sacramento lately.

O. B. Stubbs, president, Stubbs Electric Company, Portland, Ore., attended the recent meeting of the Pacific Coast Electrical Supply Jobbers Association at Del Monte, Calif.

Al C. Joy, manager publicity department, San Joaquin Light & Power Corporation, Fresno, Calif., was the principal speaker at a recent meeting of The Electric Club of Los Angeles. Mr. Joy's subject was, "From Prometheus to the Central Station."

C. R. Gill has been made manager of the Pacific Gas and Electric Company's Colusa (Calif.) district; **J. V. Kyle** has become manager of the company's Placer County district; and **L. J. Nevraumont** has been appointed assistant manager of the company's San Joaquin division.

Lafayette Hanchett, president of the Utah Power & Light Company, Salt Lake City, has been re-elected as a director of the Chamber of Commerce of the United States. The district which Mr. Hanchett will represent includes Arizona, Colorado, Idaho, Nevada, New Mexico, Montana, Wyoming and Utah. Mr. Hanchett already has served two years on the directorate to which he has been re-elected. He has been active for many years in the business and industrial life of both Salt Lake and Utah. Besides being president of the Utah Power & Light

LAFAYETTE HANCHETT

Company he is also president of the Inter-Mountain Electric Company of Salt Lake City, vice-president of the National Copper Bank of that city, and president of the Dixie Power Company of southern Utah. He is also a member of the board of governors of the Salt Lake City Chamber of Commerce. Mr. Hanchett is the only director of the United States Chamber of Commerce chosen from the Intermountain country. In fact, he, with one other director from Oregon and two from California, are the sole representatives of the states west of the Missouri River.

H. R. Peckham, assistant general superintendent, San Diego Consolidated Gas & Electric Company, made a brief trip to Los Angeles a little while ago.

Obituary

Charles Anderson, owner of the Fremont Electric Company and the Seattle Marine Equipment Company, recently died in Seattle.

John Fallon, electrical contractor of Santa Barbara, Calif., died May 7 as the result of an automobile accident.

Horace H. Miller, secretary, Pacific Lighting Corporation, San Francisco, died in Oakland, Calif., May 28, following an operation.

Jacob Bunn, president, Sangamo Electric Company, Springfield, Ill., died May 10 after an illness of many months. He had been identified with the electrical industry for about thirty years and had been president of the Sangamo Electric Company continuously since its organization in 1899.

TRADE NOTES

Westinghouse Electric & Manufacturing Company, East Pittsburgh, recently has developed three new percolators, a new electric hot plate and a table stove. In two of the new percolator sets a 9-cup-pot type and a 9-cup-urn type, with creamers, sugars and trays to match, are a radical departure from the former design. They will be known as the Empire design and will be finished with a new process which gives them a platinum silver appearance that is softer in tone than the highly polished finish.

Thomas Machinery Company, Los Angeles, has added to its staff William C. King, for four years with the power sales department of the Los Angeles Bureau of Power and Light. Mr. King will handle the sales of the equipment manufactured by **The Electric Controller & Manufacturing Company,** Clevelanr, of the synchronous motors of the **Electric Machinery Manufacturing Company,** Minneapolis, and the transformers made by the **ulhlman Electric Company,** Bay City, Mich.

Sangamo Electric Company, Springfield, Ill., has issued bulletin No. 71 containing instructions for Sangamo D-5 watthour meters. Photographs and diagrams as well as a table of train ratios and disk constants for two-wire D-5 meters are included in the bulletin.

Fairbanks, Morse & Company have issued bulletin H-338, which is "An Electric Machinery Catechism." It is a 36-page bulletin giving in question-and-answer form a complete resume of the most important theoretical and practical features of the common types of direct current and alternating current motors, generators and control equipment. The pamphlet is intended for the reader unfamiliar with the technical features of electricity. It is profusely illustrated with various types of machines and electrical drawings discussed and covers the field completely.

C. F. Braun & Company have opened sales and engineering offices at Dallas, Texas, in the Republic National Bank Building, with **V. V. Jacomini** as manager. The office is prepared to make engineering surveys and submit quotations on the Braun products.

Allen Bradley Company, Milwaukee, Wis., has issued bulletin No. 710 covering its new line of type J-1552 across-the-line starting switches, equipped with inducto-therm relays.

Perkins Electric Equipment Company, San Francisco, is representing the Cook Porcelain Insulator Corporation of Cambridge, Ohio, in that city.

Simplex Electric Heating Company, Cambridge, Mass., has issued a 15-page catalog, featuring its complete new line of Simplex electric ranges and the new automatic unit. Photographs of the range with descriptions are given, as well as illustrations and features of the automatic unit governing the temperature control of the range.

General Electric Company, Schenectady, N. Y., has developed several new types of supports and arrangements in switchboard accessories, among them the latest types in busbar supports and a new arrangement of support for group-mounted rheostats, using pipe and standard pipe fittings.

Brown & Pengilly, Inc., San Francisco and Los Angeles, have issued catalog No. 3 for 1926 on switchboards and panel boards, safe-line service switches, motor-starting switches, ebony asbestos wood, testing equipment, steel cabinets, as well as fire-alarm systems. The catalog is illustrated with photographs and diagrams and contains complete price lists.

Conceded by archeologists as the origin of the Charleston is this picture dug up out of Lake Merced golf course. It pictures one Burrell S. Manuel, sales manager of Fobes Supply Company, in a striking pose, very striking. After seeing this picture promoters tried to arrange a match with Andy Gump. "It should be interesting provided they could start and finish the same day," said a big promoter. Andy is yet to be heard from.

The Electric Corporation, Seattle, has taken additional space at 321 Occidental Avenue to care for its increasing business.

The Mine & Smelter Supply Company, Denver, has taken on the Riddle line of lighting fitments.

The Hart & Hegeman Manufacturing Company, Hartford, Conn., has issued literature descriptive of its new style H&H, No. 8601, tumbler switch.

Ingersoll-Rand Company, New York City, has issued a new publication on "Direct-Injection Oil Engines for All Purposes." Illustrations and descriptions are given, portraying the Ingersoll-Rand oil engines as applied to electric railways, marine, power-house, industrial and building applications.

A. J. Lindemann & Hoverson Company, Milwaukee, has developed a new type of toaster, known as the Two-O-Four. This new toaster, which is made of high-grade steel with a heavy, highly polished nickel finish, takes extra large slices of bread, having a toasting surface of 4¾ x 5¾ in. It reverses toast every time the door is dropped. It has a steel braced unit and is provided with a damper-on-the-door, which prevents drafts from interfering with even toasting.

The Electric Refrigeration Corporation, Detroit, Kelvinator division, has brought out a new line of eight cabinet Kelvinator models. They are claimed to represent the latest development both in the art of household electric refrigeration and of fine cabinet-making. The interior finish is glossy white enamel on galvanized iron. All wood cabinet models are moderately priced, have cork insulation and a food storage capacity of 5½ cu.ft. Some have interiors finished in white porcelain on Armco iron. A small de luxe model has both the interior and exterior finished in white porcelain, trimmed with metal corners and edging.

Delta-Star Electric Company, Chicago, has opened a new and larger office at 140 Cedar Street, New York City, in charge of W. S. Nichols, assisted by P. H. Butler and A. R. Beger.

Power Specialty Company, New York City, which handles Foster superheaters, economizers and air heaters, has taken over the Aero Pulverizer Company and with the acquisition of this company is now in a position to build in its own shops and contract for complete steam generating units, including all heating surfaces excepting boiler proper, and to make over-all guarantees including the boiler.

The Austin-Henderson Company has branched out into enlarged quarters at Spokane and is now at home at S. 118 Lincoln Street. The firm will carry an enlarged stock of electrical machinery and has arranged and designed its new office and warehouse better to serve an increasing trade. The business is conducted by **Lee F. Austin** and **Dwight F. Henderson.**

The Electro-Kold Corporation of Spokane is making plans to put on a night shift to increase its production, according to L. J. Kimmel, vice-president, this move having been made necessary by an increase in sales of 50 per cent over the factory's normal output.

Ohio Brass Company, Mansfield, Ohio, has moved its Chicago offices from 1217 to 1714 Fisher Building, 343 South Dearborn Street.

The Garl Signal Company, Akron, Ohio, has been formed with a capital of $100,000. This company has taken over the good-will, basic patents, etc., of the Garl Electric Company and will market the Garl fire and police alarm signals for municipalities and industrial plants.

Bakelite Corporation, New York City, has issued a large folder, illustrated with interesting drawings, giving the story of Bakelite. A complete history of the product back to its earliest discovery is given and its various present-day uses are explained. In addition to this, illustrations of Bakelite in some of its various forms are given.

Wherever magnets are wound

FROM the huge shops where the super-power generators are wound, to the smallest repair shop on a side street, there is a growing preference for the strictly Rome features of Rome Magnet Wire.

A like preference is growing thruout the electrical industry for all Rome Wires. For every type is manufactured in Rome mills, on Rome machines, under Rome supervision and inspection—from wire bar to finished copper wire.

Complete control of the Rome Mills is centered in one organization, including a skilled staff of engineers whose duty is the study and development of copper wires and cables. The co-operation of these engineers is yours in solving your wire and cable problems.

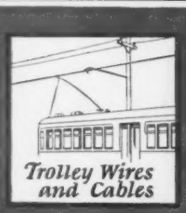
Rome Service, in the form of ample stocks, and competitive prices, is at your disposal. An opportunity to quote on any of your wire requirements will always be welcome.

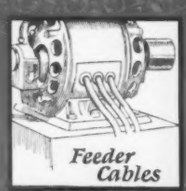
Rectangular Cotton Covered Magnet Wire

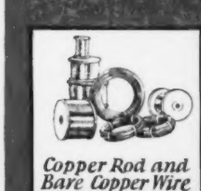
ROME WIRE COMPANY, ROME, N.Y.

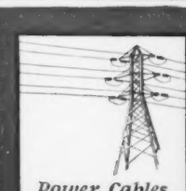
ROME WIRE

FROM WIRE BAR TO FINISHED COPPER WIRE









WHEREVER Magnet Wire is used as a component part of electrical apparatus, you will find the engineer and the man on the job have high regard for the uniform quality and time-saving elements inherent in Rome Magnet Wire.

In all Rome Magnet Wires—round, rectangular—enameled, cotton, or silk covered—only dead soft, commercially pure, electrolytic copper wire, drawn accurately to gauge, is used. Minimum outside diameter and remarkable dielectric strength are definitely assured for both the fabric insulated types, and the enameled wire.

Controlling all operations in our own mill, including the winding of cotton and the mixing of enamel, under the supervision of a highly trained technical staff, has enabled us to establish definite standards for Rome Magnet Wire. These standards have been published in convenient form, combined with tables for practical use, and have been adopted by many large organizations. A copy will be sent on request.

ROME WIRE COMPANY

Mills and Executive Offices: ROME, N.Y.

Diamond Branch: Buffalo, N.Y.

New York — 50 Church Street
Boston — Little Building
Chicago — 14 E. Jackson Blvd.
Detroit — 25 Parsons Street
Cleveland — 1200 W. 9th Street
Los Angeles — J. G. Pomeroy, Inc., 336 Azusa Street
San Francisco — J. G. Pomeroy, Inc., 51 Federal Street

That turns Metal to Gas

"The fuse blows"—What a test of engineering achievement this casual statement hides.

Inside that fuse excessive current creating an inferno of heat has transformed a strip of cold fuse metal to gas. Pressure quick and tremendous has dealt the fuse casing a trip hammer blow.

To appreciate the service fuses meet is to recognize the care with which they should be chosen.

It pays to specify "Union"

UNION FUSES

Because they are worth more they really cost less

THE NEW AND IMPROVED UNION® RENEWABLE FUSE

Features
that insure Union Fuse users maximum service and protection

Simplicity Renewal of a Union Fuse takes but a few seconds. Unscrew two caps and slip out the knife-blade member. The small number of parts lessens liability of misplacement.

Assembly is accomplished easily and quickly. Design is such that incorrect assembly is impossible.

Full-sized openings in both ends of the case make cleaning easy.

Service Union Renewable Fuses are more economical because they stay in service longer. The heavy, rigid construction enables these fuses to withstand repeated "blows" without impairment.

The ease and speed with which renewal is accomplished save time and labor, and shorten the time equipment is kept idle.

Safety The casing of a Union Fuse is made of heavy grey horn fibre to withstand the repeated shock of blow-outs. Obviously the renewable feature of any fuse is of no advantage if the casing does not "stand-up." The brass ends are permanently secured to the casing.

Venting is obtained and maintained by means of a carefully proportioned longitudinal passage in the casing.

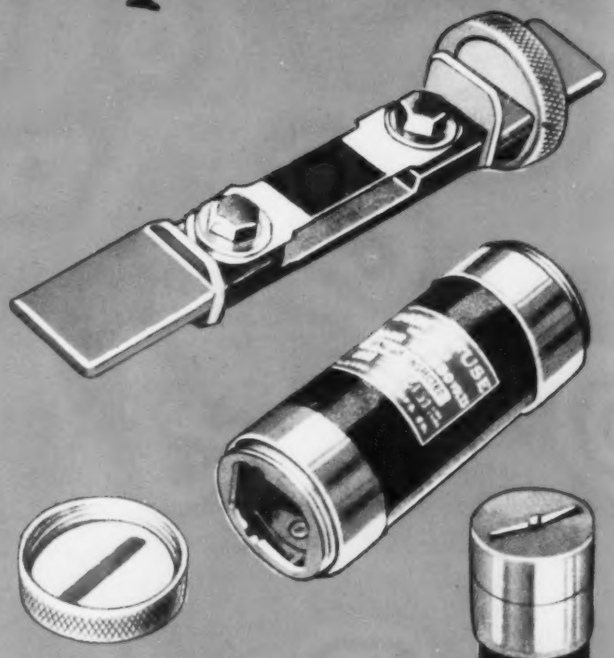
The exceptionally heavy construction of the knife blade member provides maximum rigidity and holds the blades in alignment to secure positive contact with the clips.

The fusible element is an exclusive "Union" feature. Fusion occurring midway between the contacts so that the connecting parts are always clean. The threads of the stud are not exposed so that molten metal can not cause them to "freeze."

Union Renewable Fuses always "blow" at the proper rating.

A convenient way to find the proper fuse

The Union Chart "How to select Fuses" shows quickly the proper fuse for all types of motors. One of these charts will be mailed for the asking.



A Union Renewable Fuse disassembled. Note the minimum number of parts and substantial construction.

Union Fuses are made in all standard ratings including renewable and non-renewable, indicating knife blade and ferrule types.

Plug fuses of a corresponding quality are manufactured under the trade name of "Gem."

Full information covering all types of fuses will be sent on request.

CHICAGO FUSE MFG. CO.

INCORPORATED 1889

ELECTRICAL PROTECTING MATERIALS AND CONDUIT FITTINGS

LAFLIN & 15TH STREETS ✦ ✦ CHICAGO

Harmony with durability

WITH the American woman's ever increasing interest in the decorative and illuminating possibilities of portable electric lamps, there has come a new appreciation of quality and color harmony in lamp cords.

Women are discriminating buyers, and the electrical industry is fast learning through them that it pays to build feminine good will with cords that harmonize and cords that wear.

It is only natural then that the dependable quality and wide range of attractive colors offered in Rome Lamp Cords should result in a growing demand.

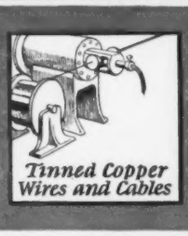
Rome mills, covering 20 acres of manufacturing floor space, are given over to the production of copper wires and cables. Every operation, from the rolling of the wire bar, to the application of the last insulation or protective covering, is under Rome supervision.

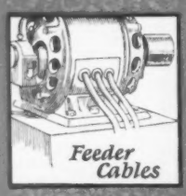
Type "PO" Parallel Lamp Cord

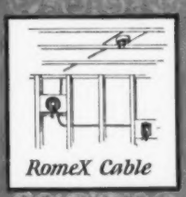
ROME WIRE COMPANY, ROME, N.Y.

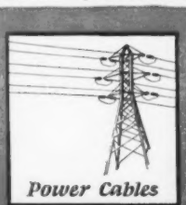
ROME WIRE

FROM WIRE BAR TO FINISHED COPPER WIRE









WHILE Rome Lamp Cords are built to harmonize with the most luxuriant surroundings, Rome Super Service Cords are built to stand the gaff of daily use in shops and mines. Each of the other Rome flexible cords—and there are many of them—are built to meet specific working conditions.

But, into every Rome cord, wire, or cable is built Rome quality.

The Rome organization with a thorough understanding of the application of wires and cables for the job, backed with 20 years' manufacturing experience, stands ready at all times to help you solve your wire and cable problems.

If you will let us know in what wires and cables you are interested, we will be glad to send you samples, catalogs, and other information that will be of help to you.

Rome-Wire

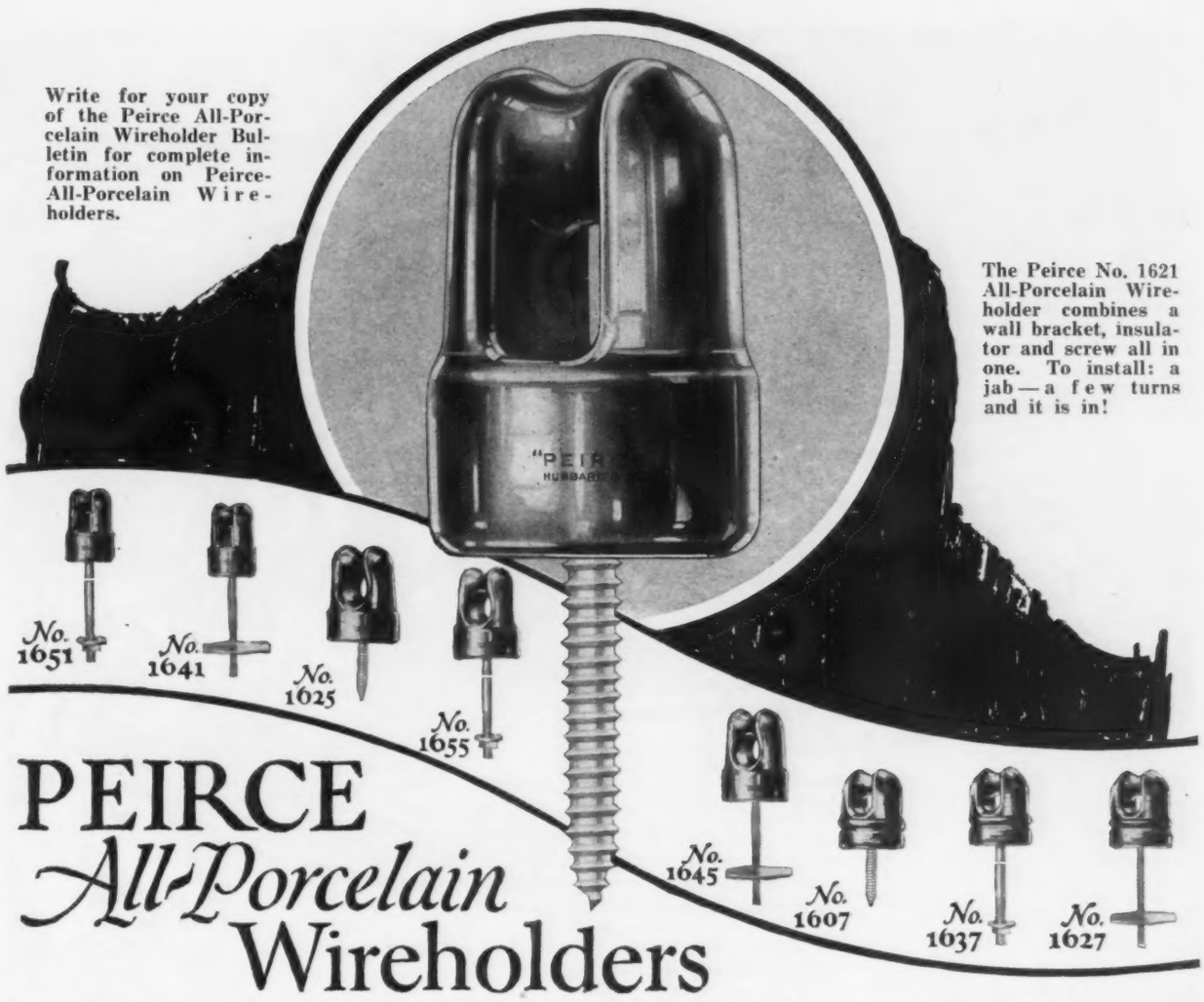
ROME WIRE COMPANY

Mills and Executive Offices: ROME, N.Y.

Diamond Branch: Buffalo, N.Y.

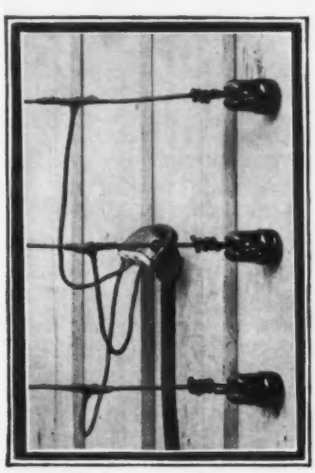
New York—50 Church Street
Boston—Little Building
Chicago—14 E. Jackson Blvd.
Detroit—25 Parsons Street
Cleveland—1200 W. 9th Street
Los Angeles—J. G. Pomeroy, Inc., 336 Azusa Street
San Francisco—J. G. Pomeroy, Inc., 51 Federal Street

Write for your copy of the Peirce All-Porcelain Wireholder Bulletin for complete information on Peirce-All-Porcelain Wireholders.



The Peirce No. 1621 All-Porcelain Wireholder combines a wall bracket, insulator and screw all in one. To install: a jab—a few turns and it is in!

PEIRCE *All-Porcelain* Wireholders



This type of Wireholder has been designed so that no metal is exposed after installation.

The cement used for attaching the screw, carriage bolt or toggle bolt to the Insulator develops the full strength of the Insulator. The cement is non-porous and is not affected by the weather.

The screws are furnished hot galvanized or brass with a standard wood screw thread or a DUBLTHRED. They will not rust.

The Insulators are the highest grade dry process porcelain.

Reduced Prices

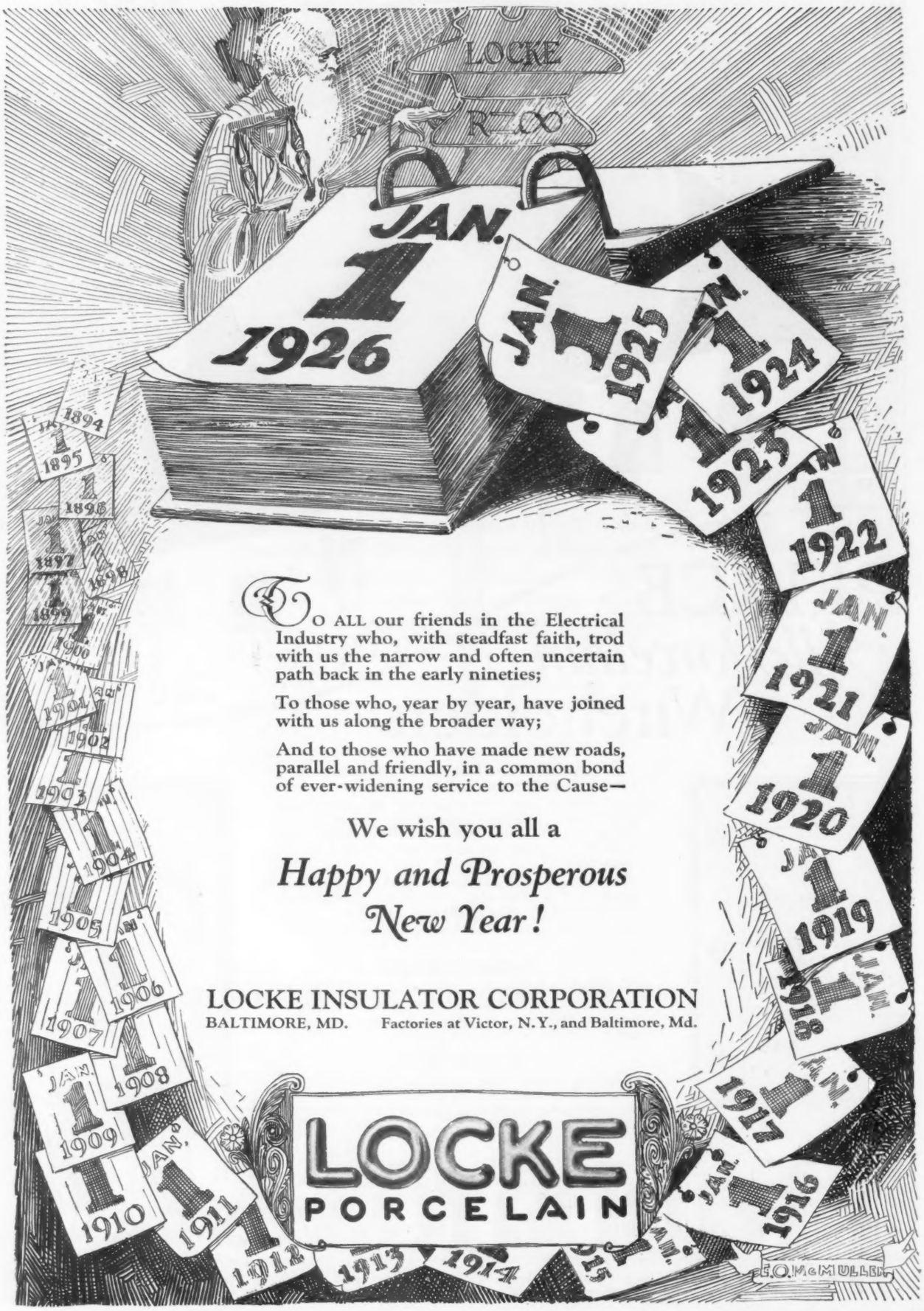
On Peirce All-Porcelain Wireholders and Secondary Racks. Never before have you been able to make installations of Secondary Lines and Service Connections at so low a cost.

Ask your Jobber

Peirce Construction Specialties and Hubbard Pole Line Hardware are carried in stock and sold exclusively through the leading Electrical Jobbers.

Hubbard and COMPANY

PITTSBURGH & OAKLAND, CAL. & CHICAGO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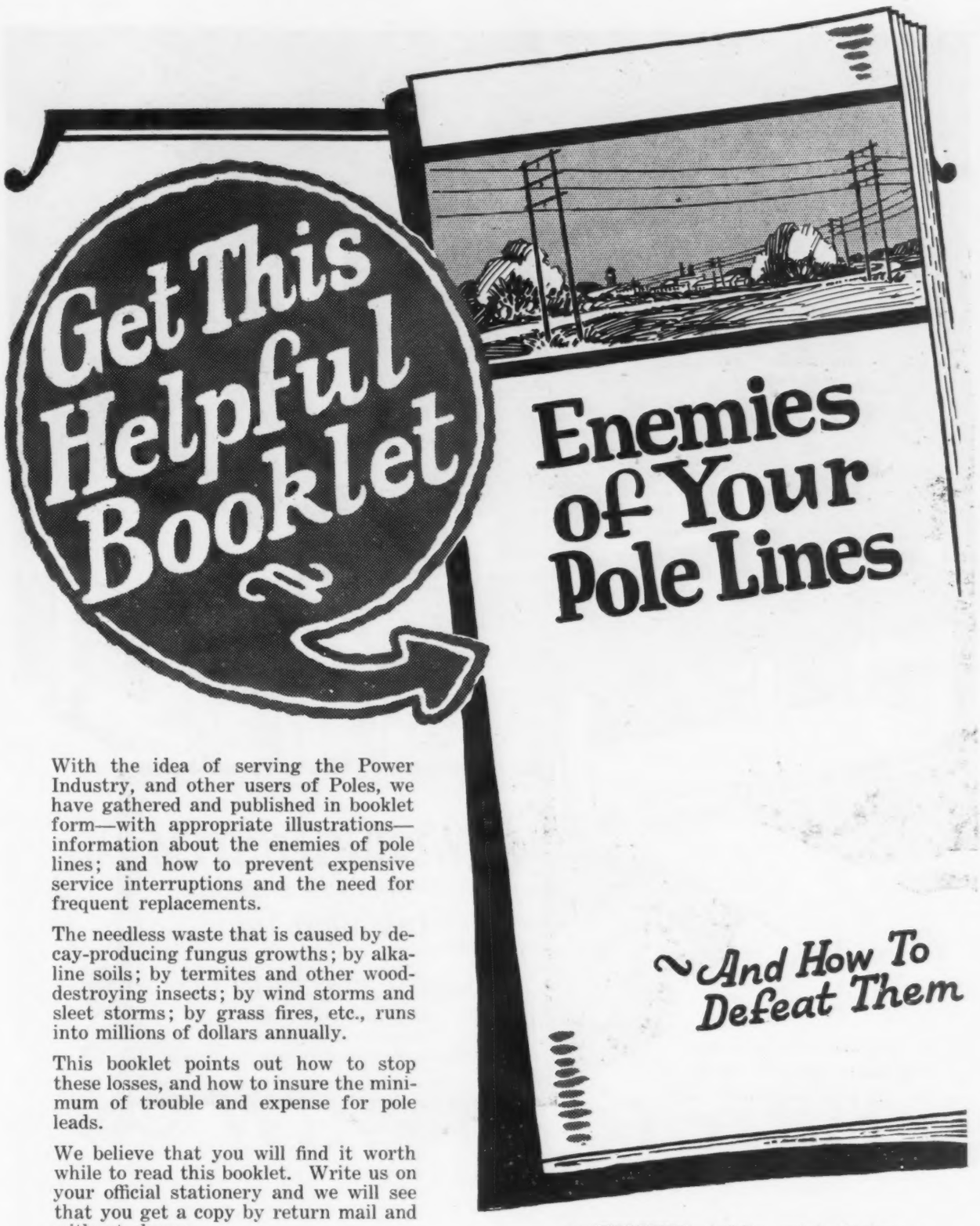
TO ALL our friends in the Electrical Industry who, with steadfast faith, trod with us the narrow and often uncertain path back in the early nineties;
To those who, year by year, have joined with us along the broader way;
And to those who have made new roads, parallel and friendly, in a common bond of ever-widening service to the Cause—
We wish you all a
Happy and Prosperous New Year!
LOCKE INSULATOR CORPORATION
BALTIMORE, MD. Factories at Victor, N.Y., and Baltimore, Md.
LOCKE
PORCELAIN
E.O. McMULLEN



With the idea of serving the Power Industry, and other users of Poles, we have gathered and published in booklet form—with appropriate illustrations—information about the enemies of pole lines; and how to prevent expensive service interruptions and the need for frequent replacements.

The needless waste that is caused by decay-producing fungus growths; by alkaline soils; by termites and other wood-destroying insects; by wind storms and sleet storms; by grass fires, etc., runs into millions of dollars annually.

This booklet points out how to stop these losses, and how to insure the minimum of trouble and expense for pole leads.

We believe that you will find it worth while to read this booklet. Write us on your official stationery and we will see that you get a copy by return mail and without charge.

Texas Creosoting Company
Orange, Texas, U. S. A.

TERMITES (white ants) destroy more than $45,000,000 worth of timber in this country each year. This booklet tells how to safe-guard your pole lines from their ravages.

To the public this sign means "This home is *adequately* wired with *high quality* materials by a *reliable* contractor."

GENERAL
MERCHANDISE DEPARTMENT

Thousands of contractors have already ordered these signs

THE G-E Wiring System sign has already been reprinted three times! Several thousand wide-awake electrical contractors have ordered these signs. You see them everywhere on buildings under construction. They mean that these contractors are doing adequate wiring jobs at adequate *profit*, that they are making capital out of the G-E Wiring System advertising—that they are no longer cutting prices to land jobs, but are getting bigger contracts at full profit. Are you getting your full share of this?

Two-color ads—every month—in the Saturday Evening Post are making the public realize the importance of the G-E Wiring System and that it is worth the few dollars extra cost.

GE WIRING SYSTEM
—for lifetime service

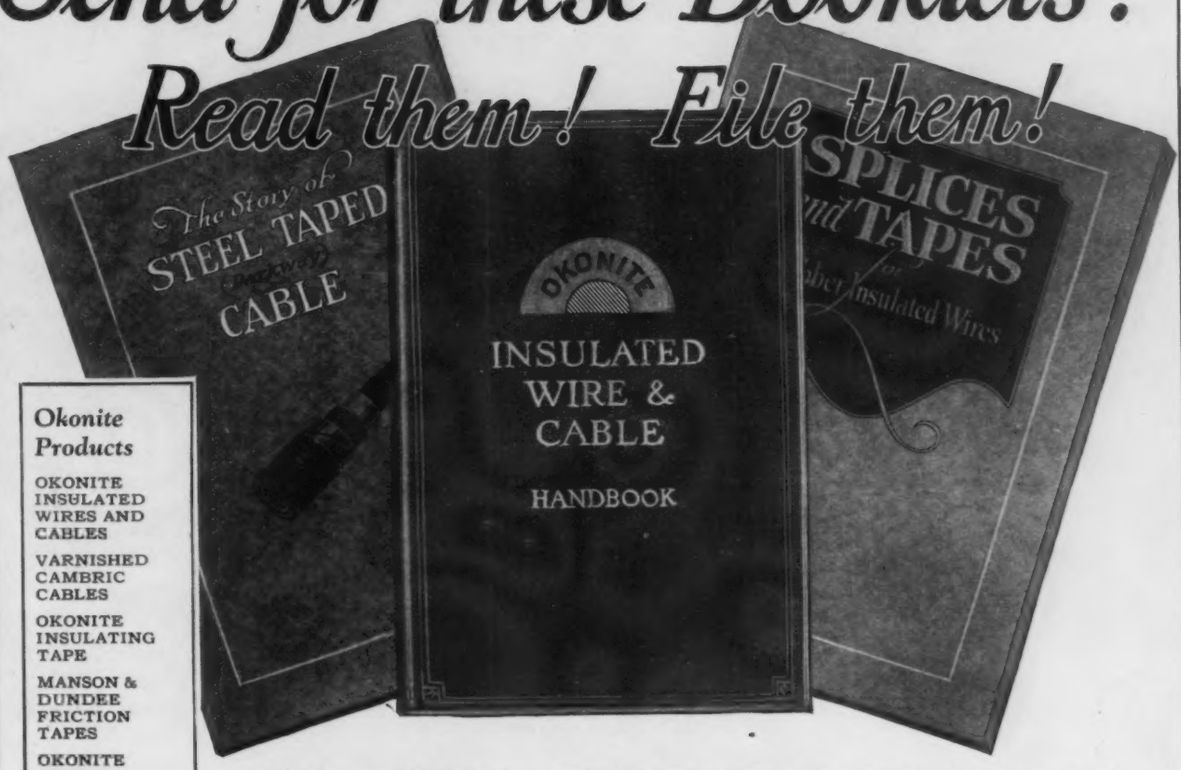
ELECTRIC

BRIDGEPORT, CONNECTICUT

Installation of O-B Insulators means a long period of troubleless service with the insulators literally "out of mind." You can put them up and forget them.
Enviable records for reliable service made by O-B Insulators of all types is the result of building yearage into them at every step from design to final inspection.
The Ohio Brass Company
Mansfield, Ohio, U. S. A.
B
INSULATORS
TIME IS THE TEST

Send for these Booklets!

Read them! File them!



Okonite Products

OKONITE INSULATED WIRES AND CABLES

VARNISHED CAMBRIC CABLES

OKONITE INSULATING TAPE

MANSON & DUNDEE FRICTION TAPES

OKONITE CEMENT

OKOCORD

OKOLOOM

Okonite-Callender Products

IMPREGNATED PAPER CABLES

SUPER-TENSION CABLES

SPLICING MATERIALS

HANDBOOK: OKONITE INSULATED WIRE AND CABLE—This handy volume of 100 pages contains just that data one would expect to find in a real Handbook on the subject treated. In addition it tells how carefully Okonite Products are made, covers each principal kind of wire and cable, and explains each step in their manufacture. Profusely illustrated with views of our factory, processes, and "close-ups" of the finished products.

THE STORY OF STEEL-TAPED CABLE—You learn the "Why" of this popular type of cable, sometimes called "Parkway"; its development, purpose and advantages. Illustrations show actual construction in detail of Okonite Steel-Taped Cable and typical installations for Ornamental Street Lighting, Police and Fire Alarm Systems, Railroad Signals and Lighting Circuits. Complete "Specifications" and Tables for service up to 7,000 volts.

SPLICES AND TAPES FOR RUBBER INSULATED WIRES—Sixteen pages of worth-while information on The Importance of a Perfect Splice; The Important Properties of Tape; How to Recognize These Properties; and How to Make a Perfect Splice. Interesting description of "Okonite", "Manson", and "Dundee" "A" and "B" Tapes. Fully illustrated.

THE OKONITE COMPANY
THE OKONITE-CALLENDER CABLE COMPANY, INC.

FACTORIES: PASSAIC, N. J. PATERSON, N. J.

SALES OFFICES: NEW YORK . CHICAGO . PITTSBURGH . ST. LOUIS
ATLANTA . BIRMINGHAM SAN FRANCISCO LOS ANGELES

F. D. Lawrence Electric Co., Cincinnati, O.
Novelty Electric Co., Phila., Pa. Pettingell-Andrews Co., Boston, Mass.
Canadian Representatives: Engineering Materials Limited, Montreal
Cuban Representatives: Victor G. Mendoza Co., Havana

CHECK THE BOOKLETS YOU WANT AND MAIL COUPON TODAY.

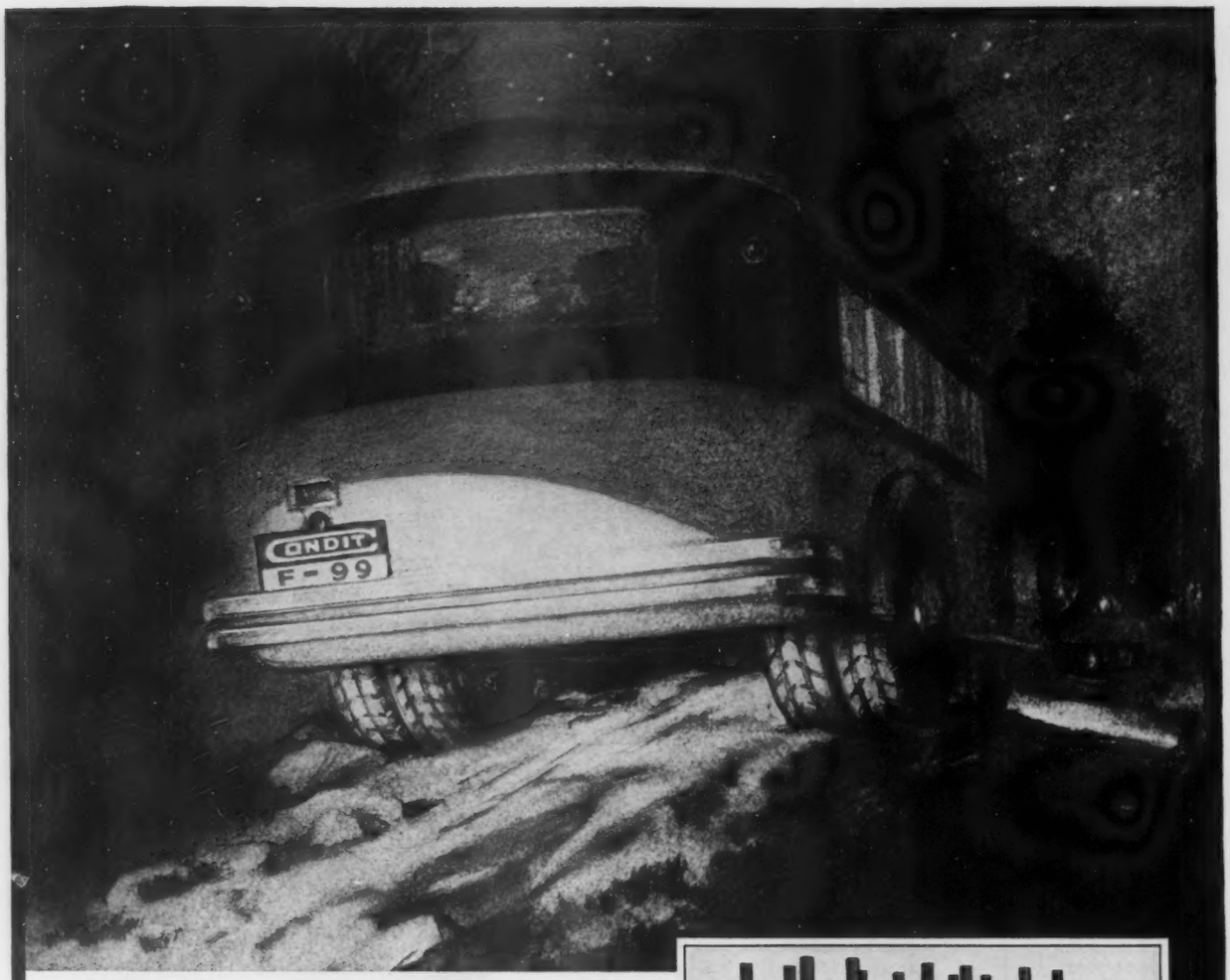
THE OKONITE COMPANY, PASSAIC, N. J. *Please send me booklets as marked below:* J.E.

Name.....

Street Number..... City and State.....

Official Position..... with.....

☐ OKONITE HANDBOOK ☐ SPLICES AND TAPES ☐ "PARKWAY" CABLE



Heavy Duty

The gruelling daily grind of long heavy transportation led to the development and use of twin tires.

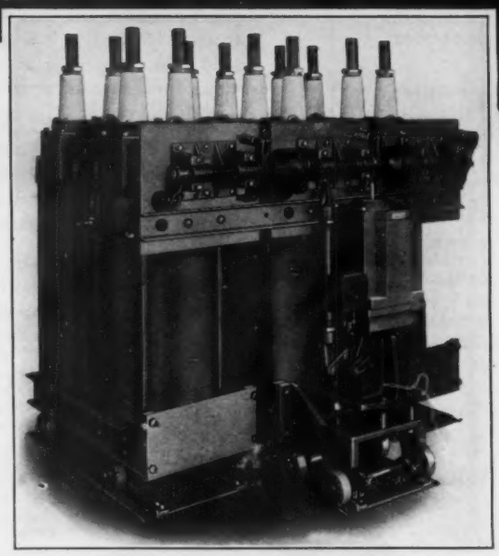
In like manner has the Condit type F-99 *triple pole*, *dual-tandem* unit oil circuit breaker been developed to meet the ever increasing demands for high interrupting capacities of the larger power systems.

Double tanks, resilient features and truck type, of course. For further information—

"*Get in touch with Condit*"

CONDIT ELECTRICAL MFG. CORP.
Manufacturers of Electrical Protective Devices
Boston, Mass.

Represented by The H. B. Squires Co. in Seattle
San Francisco and Los Angeles



Type F-99 8335

Interrupting Capacity 50,000 Amperes at 15,000 Volts

CONDIT

Want to see my New Model '76?

Revolutionary!

A Satisfactory Profit
Guaranteed Every Dealer

The Model '76 Automatic sells at a price that compares favorably with that of any high grade washer in America.

Two Sales Plans are available, each assuring the dealer a satisfactory profit.

First—We pay all sales expense and guarantee you a profit of $25.00 a machine.

Second—If you have your own Sales Organization, your margin will be ample to enable you to pay your salesmen $25 a machine.

New Ten Year Guarantee

Within ten years from date of sale, upon demand, and delivery F. O. B. its factory, the Automatic Electric Washer Company, Inc., agrees to thoroughly REBUILD (replace all worn parts, refinish and place in condition, substantially as good as new, for all practical purposes) and deliver to the owner, F. O. B. Newton, Iowa, any Model '76 Automatic Electric Washer, upon payment of the sum of $25.00

This Ten-Year Guarantee is in addition to our regular Guarantee covering replacement of any part showing defects in material or workmanship within one year from date of purchase.

The new Ten-Year Guarantee of Model '76 Automatic exceeds anything ever before known in the industry. It will be a powerful influence for increased sales. It will establish confidence at once.

AutoMatic
Washer
WITH SELF-DRAINING COPPER TUB
'76
AutoMatic
Washer
WITH SELF-DRAINING COPPER TUB

New Automatic Model '76

The Hydro-Disc Washing Principle

The Hydro-Disc principle of agitation is a happy medium between the old-time projecting pegs and the machine with no "innards" at all. Experience pretty generally endorses the idea that some propulsive interior force is preferable, and our long experimentation and observation convinces us that the Hydro-Disc is the ideal solution for this purpose.

Scientifically designed, it forces gallons and gallons of hot suds through and through the fabrics, 110 times a minute. This hurricane of saturation, in a remarkably brief time, results in a snowy-clean wash, without the slightest injury to the most delicate fabric.

Copper Tub

A Copper Tub cannot be improved upon. For years it has been "standard equipment" with every Automatic. It is corrugated for greater strength and rigidity, highly polished and tinned inside—easy to keep clean. Drains itself through sloping grooves in the bottom. Small door in base provides water chute and affords access to the outlet. The door is easily removed to allow connection of rubber hose to threaded outlet if desired.

Aluminum Top

The Cast Aluminum Top forms a double lid, completely enclosing the machine-cut gears which operate the Hydro-Disc. It assures a lifetime of service, as there is nothing to check, warp or corrode. Entire top is highly polished to an attractive satin-like finish.

Cabinet

The Model '76 has a strong, circular base of 16-gauge rolled steel, deeply embossed and electric spot-welded. Duco finish, same as automobiles. The color is olive green, attractive and durable. Base completely encloses all moving parts.

Three substantial legs enable machine to rest solidly even on irregular floor, as a tripod.

Improved Silent Top Drive

The Hydro-Disc is driven from the top of the tub, not through tub bottom. Washing mechanism may be controlled by opening or closing lid or by separate control. All levers are nickel-plated, and all mechanical parts are galvanized.

Worm Gear Drive

Silent and dependable, because it is not coupled direct to motor, but operated by means of "V" belt and pulley on main drive shaft. This construction makes high speed unnecessary, and therefor insures of longer life. Timken bearings at each end of main shaft. The entire unit runs in a bath of oil.

Oilless Bearings

High-grade oilless composition (not wood) bushings at all points solve the oil problem. They insure smooth and silent operation and, being liberally proportioned, insure long service and eliminate the nuisance of oiling.

Machine-cut Gears

The worm gears and all the spur gears and pinions are accurately cut by machinery, thus securing an absolutely perfect fit, longer service and quiet operation.

Motor

An efficient and dependable motor operates washer and wringer together, or separately if desired. It is easy to lubricate—simply unlock motor and it swings down to floor.

Attachment Cord

The improved rubber-covered attachment cord is detachable. Fitted with standard steel armored plug at one end and appliance plug on the other. Connects to terminals through slots in washer base. Provides means of removing cord between washings, and can also be used on other appliances, such as electric iron, percolator, etc.

New Type Wringer

Equipped with an improved Metal Wringer, built on the unit principle. Every part, including the full 12-inch soft cushion rolls, instantly removable without tools. Equipped with Stationary and Reversible Aluminum Drain Boards and Instant Tension Release. Driven direct from washer worm drive unit below the tub.

Firm Name
Town
State
1801

Automatic Electric Washer Company

For 18 Years Manufacturers of High Grade Washing Machines Exclusively

1801 Third Street NEWTON, IOWA, U. S. A.

Just write your name and address then clip and mail—That's all

The Railway Utility Company of Chicago is the sole distributor of Chromalax Strip Heaters for use in heating of railroad and street cars in United States and Canada.

Section showing the triple resistance coil imbedded in a refractory material making it possible to put in a longer and larger cross section resistor. This construction gives uniform distribution of heat.

CHROMALOX

The trade mark that stands for supreme quality and value. Look for it on your new space heater.

$1.75 List
$1.60 Each
in lots of 100

Another addition to the Chromalox line

—A SPACE HEATER without an equal in Quality or Price—

Chromalox Strip Heaters have broken all records for performance including heavy duty and high temperature applications.

You can expect the same superiority from our **Space Heater** for ordinary applications.

They were designed and are produced along the same basic lines—by the same ingenuity and skill that made possible the revolutionary Chromalox refractory sheathed unit in various forms.

The adoption of Chromalox Strip Heaters for car heating on 1500 volts D. C. by the Illinois Central Railroad in connection with Chicago Electrification is proof of our claim that **Chromalox** leads the field.

Chromalox refractory sheathed strips, rings and space heater with embedded resistor and the equipment and process used in their manufacture are fully covered by patents issued and pending. Our rights will be rigidly enforced.

CHROMALOX

Trade Mark Reg. U. S. Pat. Off.

Service—We ship from stock within 24 hours

Edwin L. Wiegand Co.

422 First Avenue, Pittsburgh, Pa.

Chicago Office: 20 East Jackson Blvd. Philadelphia Office: 259 N. Lawrence St. New England Representatives: Hynes & Cox Elec. Corp., 406 North Pearl St., Albany, N. Y. Pacific Coast Representatives: The Electric Material Co., 589 Howard St., San Francisco, Calif. Hinckley Bldg., Seattle, Wash. 735 Consolidated Bldg., Los Angeles, Calif.

SPACE HEATERS SHIPMENT FROM STOCK

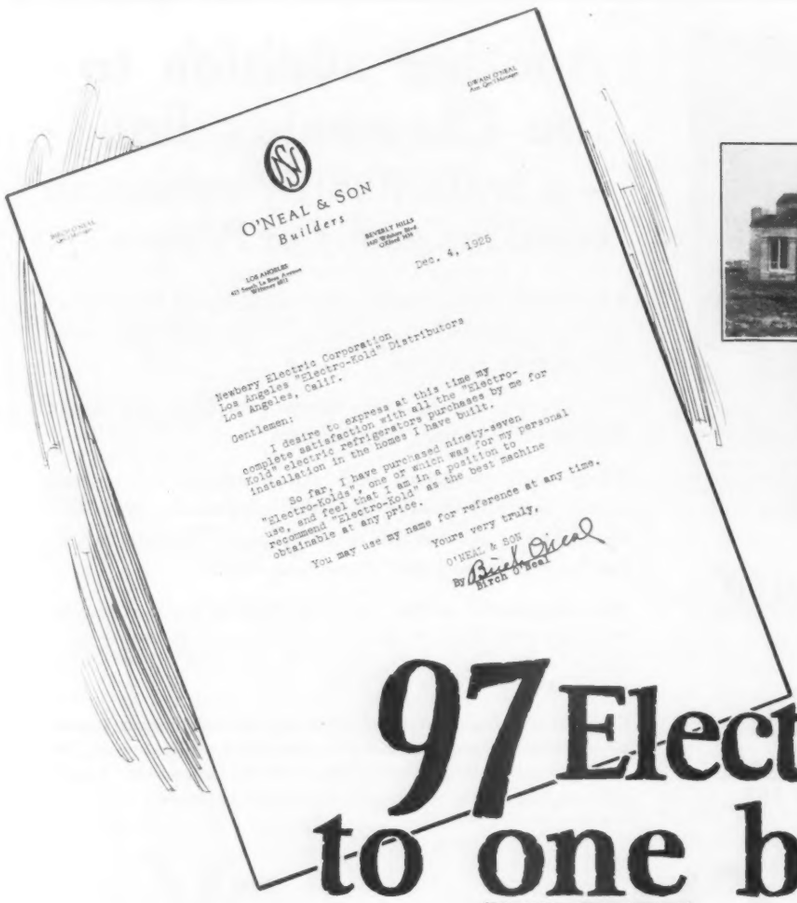
SH—2150, 2 ft. 500 watts, 110 volts.
SH—2250, 2 ft. 500 watts, 220 volts.
SH—2255, 2 ft. 500 watts, 250 volts.

In addition to the above space heaters we can ship 70 different cataloged Strip Heaters from stock.

A HEATER FOR EVERY APPLICATION

Let us prove our claim

EDWIN L. WIEGAND CO., 422 First Ave., Pittsburgh, Pa.
Please send me booklet C-100 on Chromalox Strip Heaters and Space Heaters.
Company.....
Address.....
State.....
Attention.....
E


O'NEAL & SON
Builders

Dec. 4, 1926

Newbery Electric Corporation
Los Angeles "Electro-Kold" Distributors
Los Angeles, Calif.

Gentlemen:

I desire to express at this time my complete satisfaction with all the "Electro-Kold" electric refrigerators purchased by me for installation in the homes I have built.

So far, I have purchased ninety-seven "Electro-Kolds", one or seven was for my personal use, and feel that I am in a position to recommend "Electro-Kold" as the best machine obtainable at any price.

You may use my name for reference at any time.

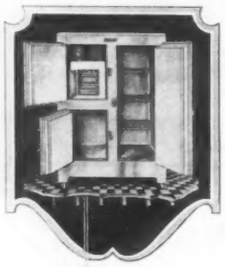
Yours very truly,

O'NEAL & SON

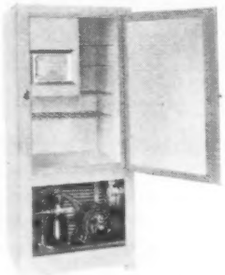
By Birch O'Neal

Orders by O'Neal & Son for 97 machines were for installation **in individual homes.** Here are shown the fine types of homes in which O'Neal & Son are installing Electro-Kolds.

97 Electro-Kolds to one builder!



Seven sizes of Electro-Kold for installation in ice chambers of standard refrigerators. Side or top icers. Compressor of more than ample capacity — and built to **last!** Over 100 less parts than any other electric refrigerator.



At the right is shown "The Bungalow," self-contained Electro-Kold for the small home or apartment. Low price. Over 7 cubic feet capacity. Two ice trays, room for a third. Other unit models to meet various size and price requirements.

SALES of Electro-Kolds to O'Neal & Son (one for 31 machines and the other for 66) are among the largest ever made in the Los Angeles territory for electric refrigerators to be installed in individual homes. They were placed through the Newbery Electric Corporation, Electro-Kold dealers.

The fact that O'Neal & Son purchased Electro-Kolds after a thorough investigation shows the reliability, satisfactory price, and attractiveness of the Electro-Kold machine, due to its many exclusive features.

Electrical refrigerator sales are only in their infancy. As the field develops, central stations as well as electric dealers, will profit. Write for complete information about the Electro-Kold dealership. Ours is an extremely liberal dealer proposition.

Electro-Kold Corporation

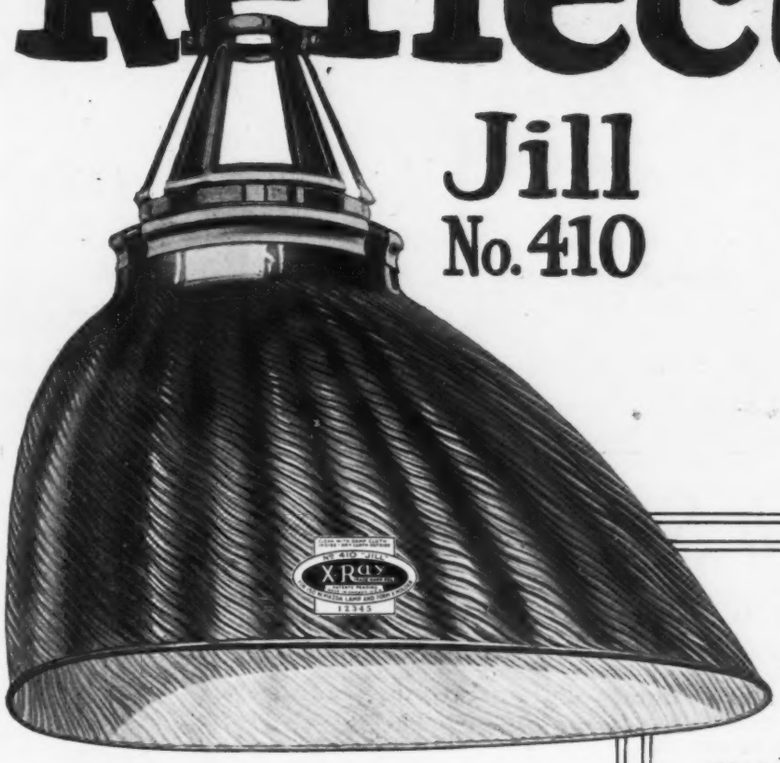
Spokane, Washington

ELECTRO-KOLD

X-Ray Reflectors

TRADE MARK REG.

Jill No. 410



$4.50 including Holder

others of the X-RAY line

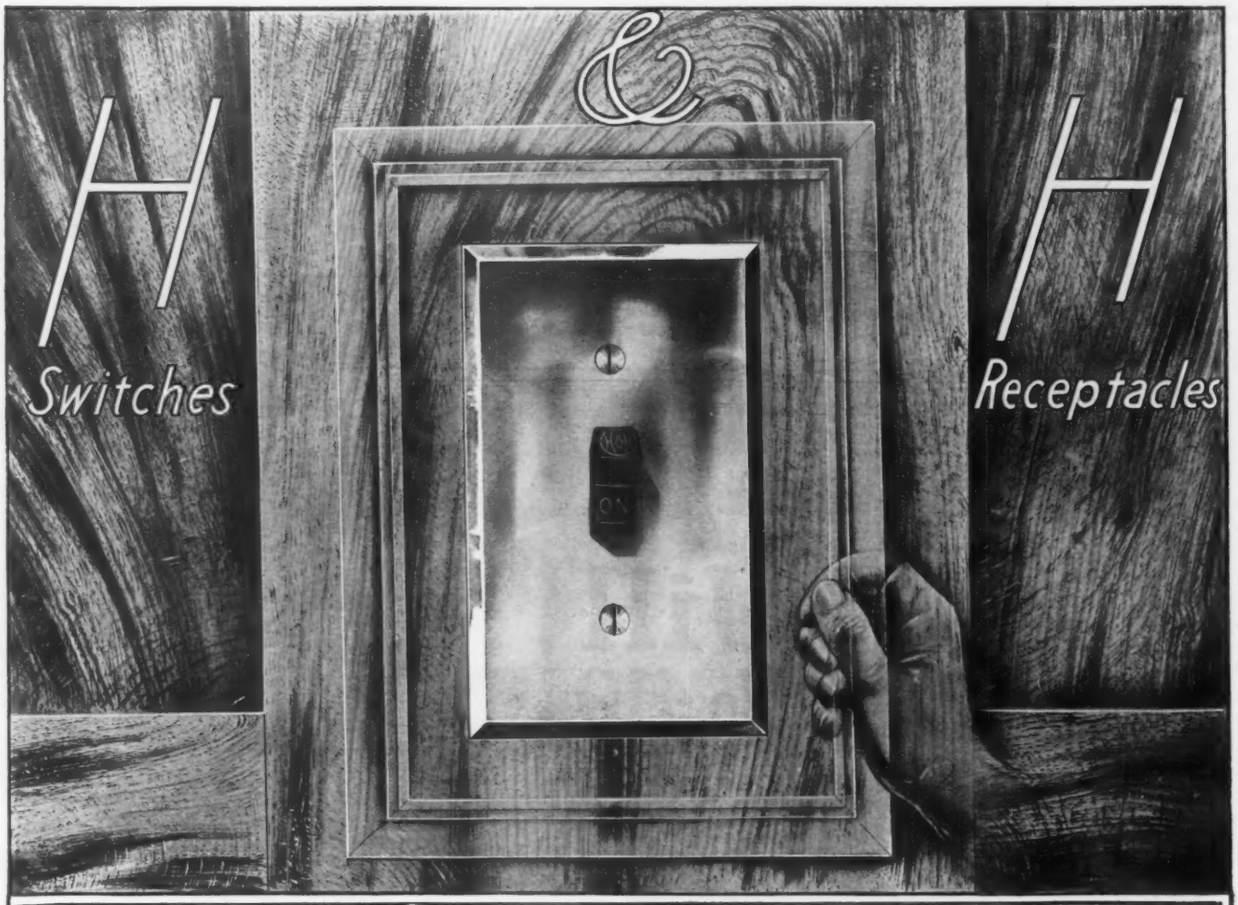
Look for the X-Ray trade mark on each reflector—none are genuine without it!

Within the Reach of All...

Four new reflectors of the same X-Ray quality that for years has made X-Ray Reflectors the "standard for show windows"—now at popular prices! The Jack and Jill for 150-100 watt lamps at $4.50 and the King and Queen for 200 watt lamps at $6.00, are two splendid values, and embody many improvements in reflector construction.

Sell X-Ray Reflectors!

CURTIS LIGHTING, Inc.
1119 West Jackson Boulevard
CHICAGO
31 W. Forty-Sixth Street, New York
3113 W. Sixth Street, Los Angeles



H&H Flush Switches—Up Front

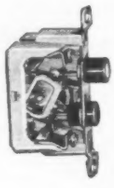
FOR "TUMBLER" REQUIREMENTS:

NO. 8601 SQUARE

Has the famous feature of the *Balanced Movement;* puts the user in touch with quality he can *feel.* Most quiet, easy-throw mechanism in any Tumbler; most positive action. Exclusive in looks and in "works", but competitive-priced.

FOR GREAT SERVICE-LIFE:

"2081" PUSH SWITCH



The "Old Reliable" for quiet, enduring service. Buttons press with an even tension; no more resistance near the end of the stroke than at the beginning. No jar as the contacts meet. Maximum value *at* medium price.

FOR THE COSTLY EDIFICE:

"GOLD STAR" PUSH

For *de luxe* jobs needing every refinement of fine artisanship. Works with the lightest of touch and complete lack of jar. Called "Silver Star" when ordered with luminous push-button.

FOR SHALLOW PARTITION WORK:

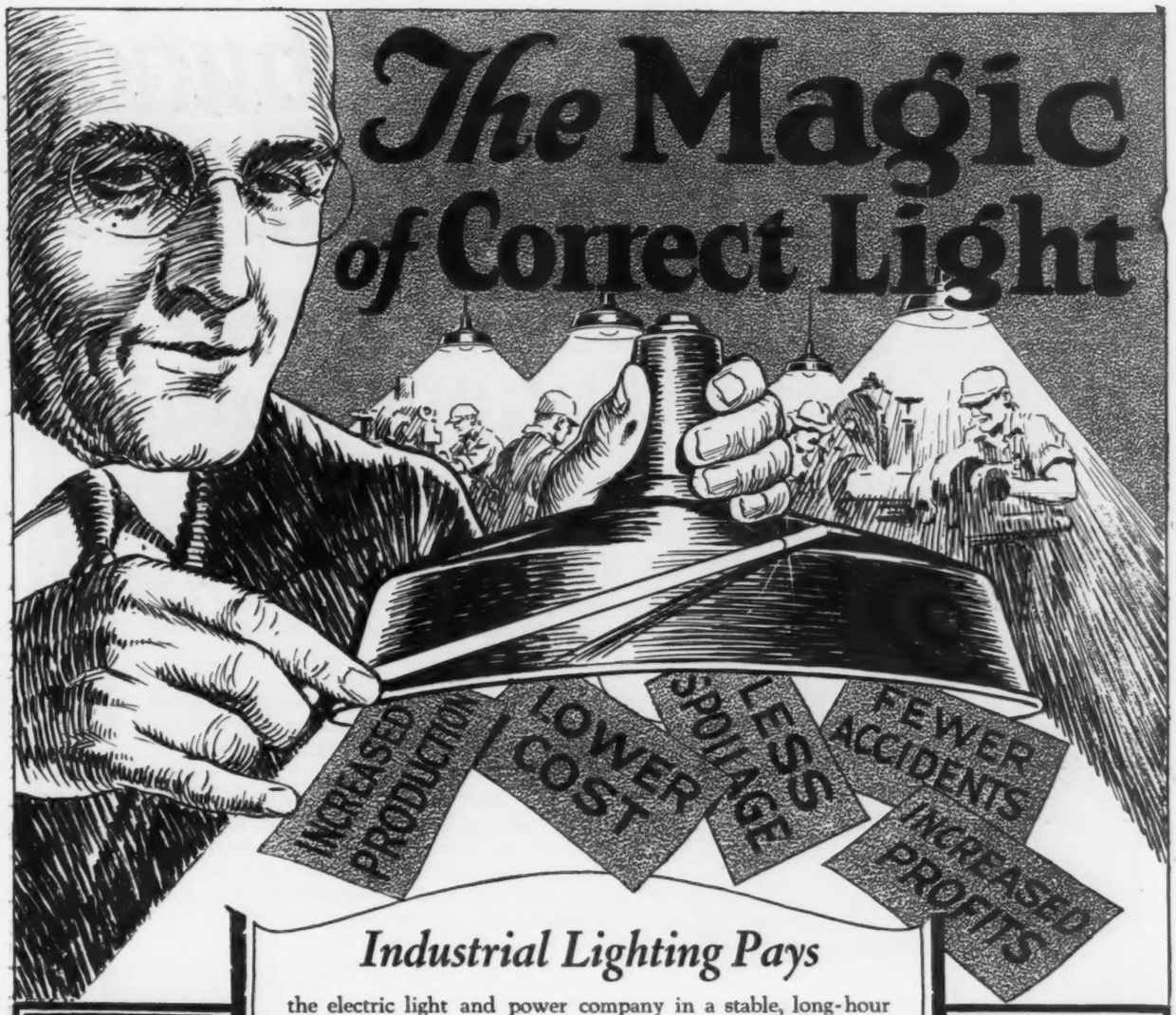
"NUTMEG" 4401-S.

Leading all switches in number installed; leading all competitive-price switches in sturdiness. Good enough so your lowest-bid jobs may safely be judged *by* the switches. Refer to "Catalogue R"—so you'll

Always Install Good Switches

THE HART & HEGEMAN MFG. CO. HARTFORD, CONN.

Makers of Electric Switches since 1891.



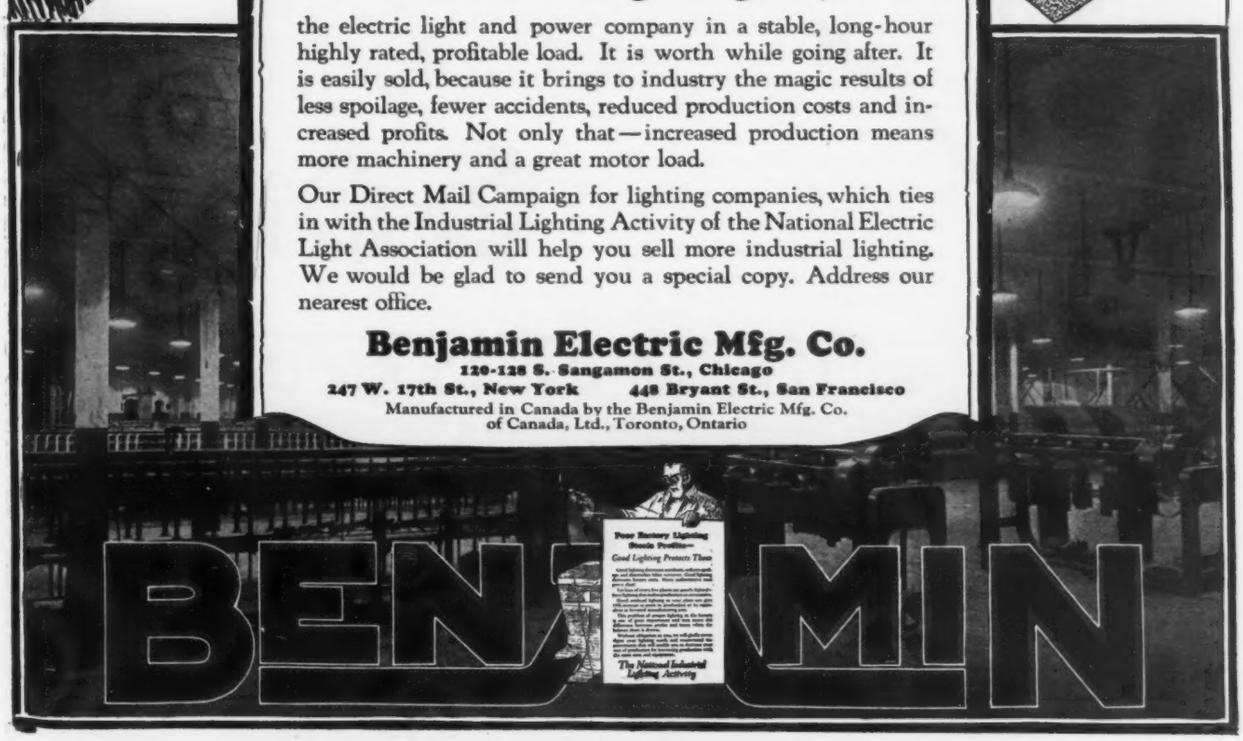
Industrial Lighting Pays

the electric light and power company in a stable, long-hour highly rated, profitable load. It is worth while going after. It is easily sold, because it brings to industry the magic results of less spoilage, fewer accidents, reduced production costs and increased profits. Not only that—increased production means more machinery and a great motor load.

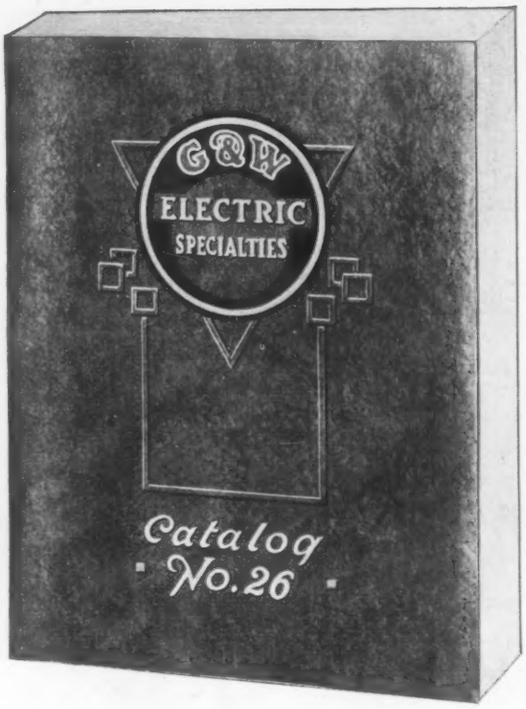
Our Direct Mail Campaign for lighting companies, which ties in with the Industrial Lighting Activity of the National Electric Light Association will help you sell more industrial lighting. We would be glad to send you a special copy. Address our nearest office.

Benjamin Electric Mfg. Co.

120-128 S. Sangamon St., Chicago
247 W. 17th St., New York 448 Bryant St., San Francisco
Manufactured in Canada by the Benjamin Electric Mfg. Co. of Canada, Ltd., Toronto, Ontario



Selection of Distribution Specialties Simplified



Send for G&W Catalog No. 26

Your copy of the new G&W Catalog No. 26, "1926 Edition," will be ready soon. It was specially compiled for your convenience. Your time is saved in selecting potheads and boxes by the new listing arrangements.

The listing of additional specialties and accessories helps you group your material purchases, thus saving clerical and transportation costs.

There are almost twice as many pages. All products are profusely illustrated, and the applications described. Dimension data is more complete. Installation directions are clearly outlined. The new catalog is a marked improvement over its predecessor, Catalog No. 12, in every way.

G&W has been making good potheads and boxes for many years. You will find them easily in the new catalog. Send in your name; so that you will not fail to get your copy.

G&W ELECTRIC SPECIALTY CO.
7780 DANTE AVE. CHICAGO, ILL.

Print in Your Name and Address in Space below

~ Then Mail to Us for Catalog

Name_____ Position_____

Company_____ Address_____

City_____ State_____

Are You on Our Mailing List ? Yes ☐ No ☐

SEWAGE DISPOSAL

A disagreeable job at the best, but the City Engineers of London, Ontario, have taken their sewage pumping plants out of this class. Their Douglas Avenue plant is the best example.

The four centrifugal pumps start progressively as the sewage rises in the sump below the pump floor and they shut down again, one at a time, as the level falls. To equalize the wear on the equipment, a selector switch is advanced a notch daily to change the order of starting.

Four 35 H.P. EC&M Oil-immersed Automatic Compensators, each controlled by an EC&M Float Switch, govern the operation of these motor driven pumps.

This plant operates automatically day and night without an attendant. EC&M Control Equipment was chosen for this job because it is oil-immersed and can be relied upon to operate continuously without interruption.

Bulletin 1042-E describes EC&M Automatic Compensators for 110 to 550 volts.

Bulletin 1047 describes EC&M Automatic Compensators for 2300 volts.

Bulletin 1020-A describes EC&M Float Switches.

THE ELECTRIC CONTROLLER & MFG. CO.

CLEVELAND, OHIO

FOR SOUTHERN CALIFORNIA:
THOMAS MACHINERY CO.
AMERICAN BANK BLDG., LOS ANGELES

FOR STATES OF OREGON AND WASHINGTON:
EICHER AND BRATT, SEATTLE, WASH.

FOR NORTHERN CALIFORNIA:
C. F. HENDERSON,
CALL BLDG., SAN FRANCISCO

←15% Less Length→
and other advantages

The advanced design of Allis-Chalmers motors can be measured in inches before you buy, as well as in dollars saved afterwards.

In Allis-Chalmers induction motors equipped with Timken Tapered Roller Bearings shafts average 15% shorter. Rigidity is therefore increased and better drive layouts are made possible.

These latest Allis-Chalmers motors are so nearly free from friction that they run for months at least without attention for lubrication. Endurance is so great; and thrust, shock, and speed are so well provided for that clearance remains permanently accurate and safe.

Whatever type of motor you select from the complete Allis-Chalmers line, you get the noted Allis-Chalmers electric steel frame and spider; the distortionless core design; the costly silver-brazing of rotor bars; the special dipping and baking of the coils; the perfected cooling, and other Allis-Chalmers developments.

In every point of motor design, including bearings, Allis-Chalmers is looked to for highest accomplishments. Write or ask about latest Allis-Chalmers economies.

ALLIS-CHALMERS MFG. COMPANY, MILWAUKEE

District Sales Offices in all Principal Cities

ALLIS-CHALMERS

NO FINER PORCELAIN MADE

Many Uses—Many Use It

BEING a homogeneous material and having a high dielectrical and mechanical strength, Westinghouse porcelain is preferred for many uses other than transmission line insulation for which it was first intended.

For example: This high grade porcelain is used in the manufacture of Westinghouse transformers, switches, lightning arresters, circuit-breakers, interior and exterior lighting fixtures —anywhere, in fact, that we find a use for porcelain.

This indicates the confidence we place in this porcelain and our extensive experience with it enables us to give excellent service to others requiring special porcelains.

Put your porcelain problem up to a Westinghouse engineer for solution.

Westinghouse Electric & Manufacturing Company
Agent for Westinghouse High-Voltage Insulator Co.
General Office: Derry, Pa.
Works: Derry, Pa., Emeryville, Calif.

Westinghouse

X-81798

Westinghouse
Subway Regulators

THE increasing demand for better street illumination in the business sections of the larger cities necessitates the addition of a large number of lighting units of high intensity. Increased regulating equipment is necessary to supply current to this new lighting equipment. The location of regulating equipment near to the high intensity sections is very desirable. In such sections both primary and secondary circuits are underground and the only practical location of the regulator is underground.

Westinghouse Subway Type Regulators have been designed for use in man holes. They have all the characteristics of the standard Westinghouse line of station type and pole type constant current regulators. The mechanism is especially designed to be enclosed in a tank of small diameter which will easily pass through the man hole opening. The tank is thoroughly weather-proof and equipped with terminal bushings to which cable joints are made.

Westinghouse Electric & Manufacturing Company
George Cutter Works South Bend, Indiana
Sales Offices in All Principal Cities of
the United States and Foreign Countries

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pennsylvania

Butte, 52 East Broadway
Casper, Wyoming, 124 W 2nd Street
Denver, 910 Fifteenth St.
El Paso, Mills Building
Fresno, Griffith-McKenzie Bldg.
Los Angeles, 420 S. San Pedro St.
Phoenix, Ariz., 412 Luhrs Bldg.
San Francisco, 1 Montgomery St.
Seattle, 3451 E. Marginal Way
Spokane, 821 Old National Bank Bldg.
Tacoma, 615 Rust Bldg.
Portland, Porter Bldg.
Salt Lake City, So. Temple & W. Temple Sts.

Westinghouse

X8575O

A new name that's fifty-six years old

GraybaR

Western
SUPPLY

Changes name–

Effective January 1st, that part of the Western Electric Company known as the Supply Department takes Graybar Electric Company as its name. This involves no change whatever in the existing distributing organization. Nor does it affect the facilities offered to buyers of electrical supplies all over the country. The significance of the change is found rather in the source of the new name, 56 years earlier in the history of the company.

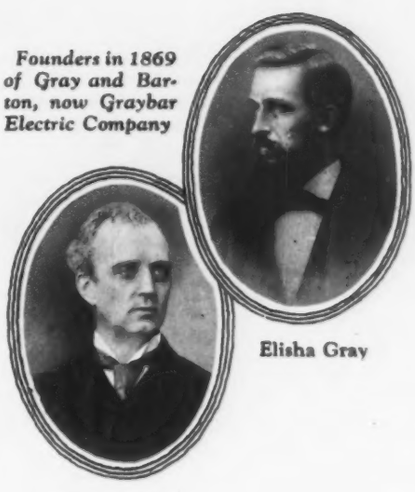
In 1869 Gray and Barton began the making of electrical supplies. In the early seventies Western Electric was adopted as the company name. After Bell invented the telephone in 1876, telephones were added

Electric
DEPARTMENT

to the line, and in 1882 the company became the manufacturing department of the Bell Telephone System.

During all these years the company has carried on at the same time a merchandising business under the title of the Supply Department, selling to the American public all types of electrical products. The growing complexity of these dual responsibilities —on the one hand, to the Bell Telephone System; on the other, to the general user of electrical supplies—now makes it advisable to separate the two functions. Hence the Supply Department, serving as before in every electrical field, becomes a distinct corporate organization.

It takes the name Graybar, derived from Gray and Barton. A new name; but carrying with it a reputation 56 years old.



Founders in 1869 of Gray and Barton, now Graybar Electric Company

Elisha Gray

Enos M. Barton

GraybaR
ELECTRIC
COMPANY · · · INCORPORATED

SUCCESSOR TO SUPPLY DEPT.
Western Electric

Below, Gray and Barton in Chicago, over half a century ago. At the right, Graybar in more than fifty cities, today.

Yesterday 56 years ago. A handful of men. Limited floor space. That was Gray and Barton, pioneer manufacturers of electrical equipment. From these beginnings, humble to be sure, came the inspiration that has directed the efforts of over half a century.

53 years ago, the company changed its name to Western Electric. But the early ideals remained to help build up the national reputation of the name—Western Electric, now Graybar.

GraybaR

QUALITY

Today

A building in each of 55 cities. Thousands of feet of floor space. Thousands of men serving the every need of those who buy or use electrical equipment. That is Graybar. A new name, of course; but, in the steady growth behind it is the pledge of old ideals of service.

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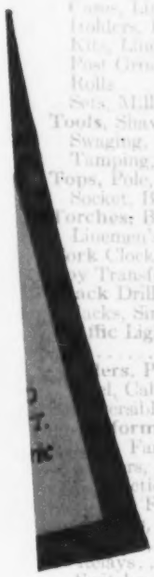

The GraybaR tag—a sign of reliability on over 60,000 electrical supplies

The index of the Graybar Year Book lists that many products. Every electrical need can be met by a product bearing the Graybar tag.

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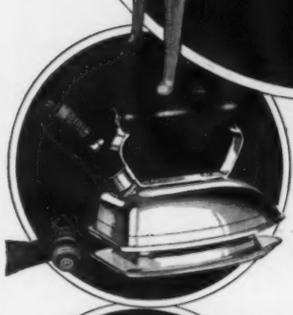
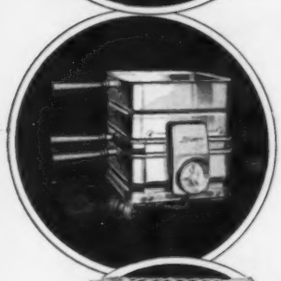
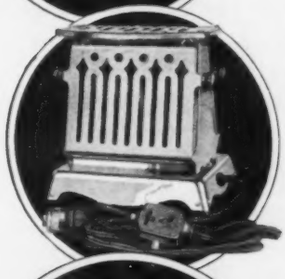


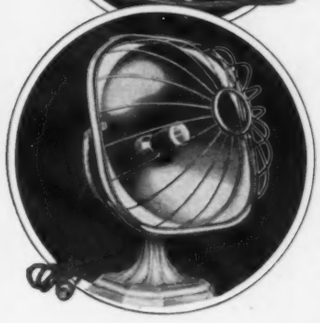
Get Action!

That's what every dealer wants —ACTION! The time it takes to show the casual visitor your stock costs good money just the same whether a sale results or not.

When showing an L&H Electrics Range, you get quick action almost invariably, because there's a genuine appeal about every model. Beauty, efficiency, economy of operation, lasting good service—these points are evident almost at a glance. The L&H Electrics ***Full Automatic Time and Temperature Controls,*** the rust-proof porcelain enameled finish, one-piece ovens with rounded corners and other important advantages are quickly shown.







Besides ranges of every size and type, the L&H Electrics Line includes, Electric Irons, Table Stoves, "Turnsit" Toasters, Heaters, Hot Plates, Curling Irons, Waffle Irons, Heating Pads, Urn Heaters, Testing Ovens, etc.

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wire

write

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Where heavy starting torque or speed control is necessary, consider the advantages of commutator type motors.

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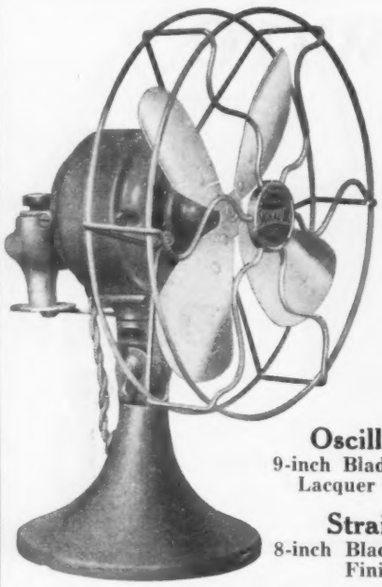

Oscillating Type
9-inch Blades Green Lacquer Finish **$12**

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A Definite Guarantee

Backed by a National Advertising Campaign

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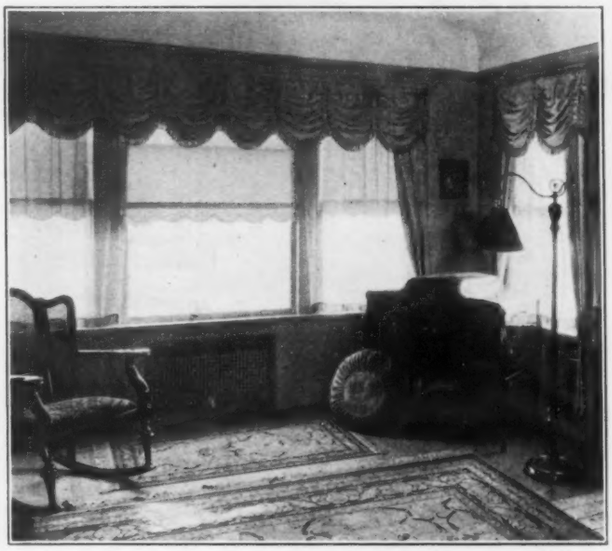

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Thousands of homes in the West are waiting to be sold on practical and economical electric heating. Sell them Apfel's "Heet-feet" electric registers that are designed to really heat. Take up no floor space, easy to install and made in all sizes from 1000 to 4000 watts.

Or for a portable heater you can sell them Apfel's 100% Radiator. Made in nine sizes. We have an especially attractive proposition to dealers. Write today and get the facts.

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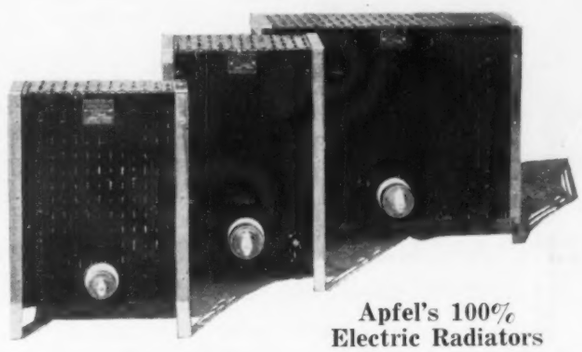
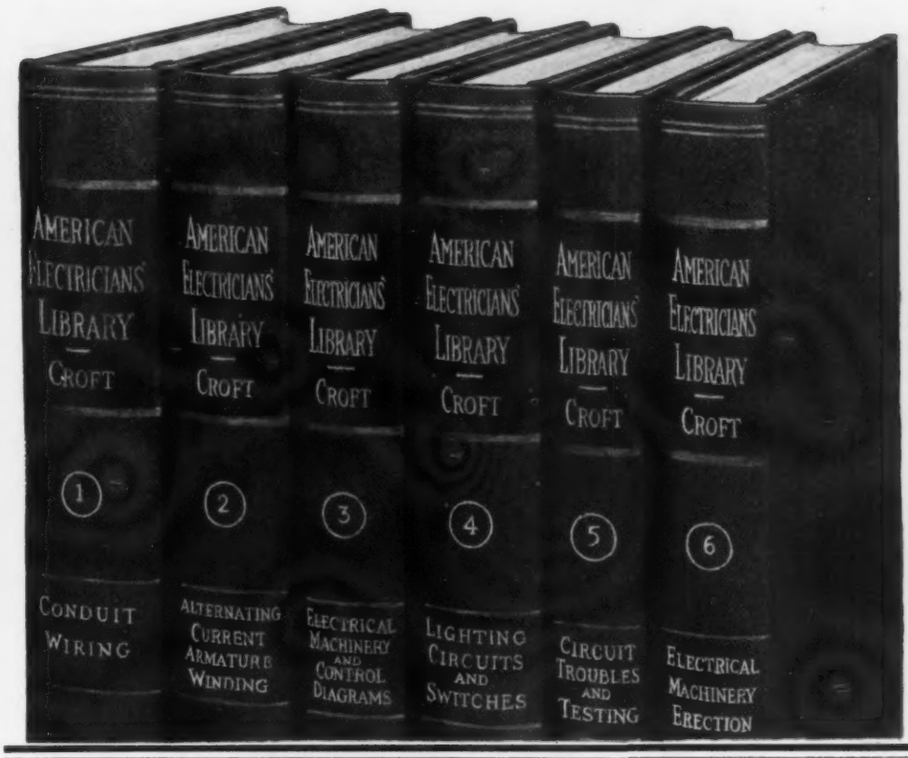


Apfel's 100% Electric Radiators



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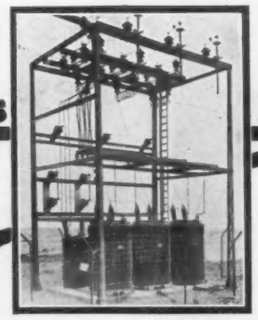

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This is a Bates Fabricated Substation. We have built substations of every type and size, and will appreciate an opportunity to submit our recommendations and cost estimates for your proposed installations.

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A Challenge In The Night

A SINGLE insulator failure—and then total darkness. Think of the result of that one **break-down.** Solid black darkness in the home, on the streets, in the theatre, the hospital, everywhere. Have you ever really considered the actual dependence placed on your insulator equipment? Have you ever tried to visualize the confusion that would probably result from just one insulator failure?

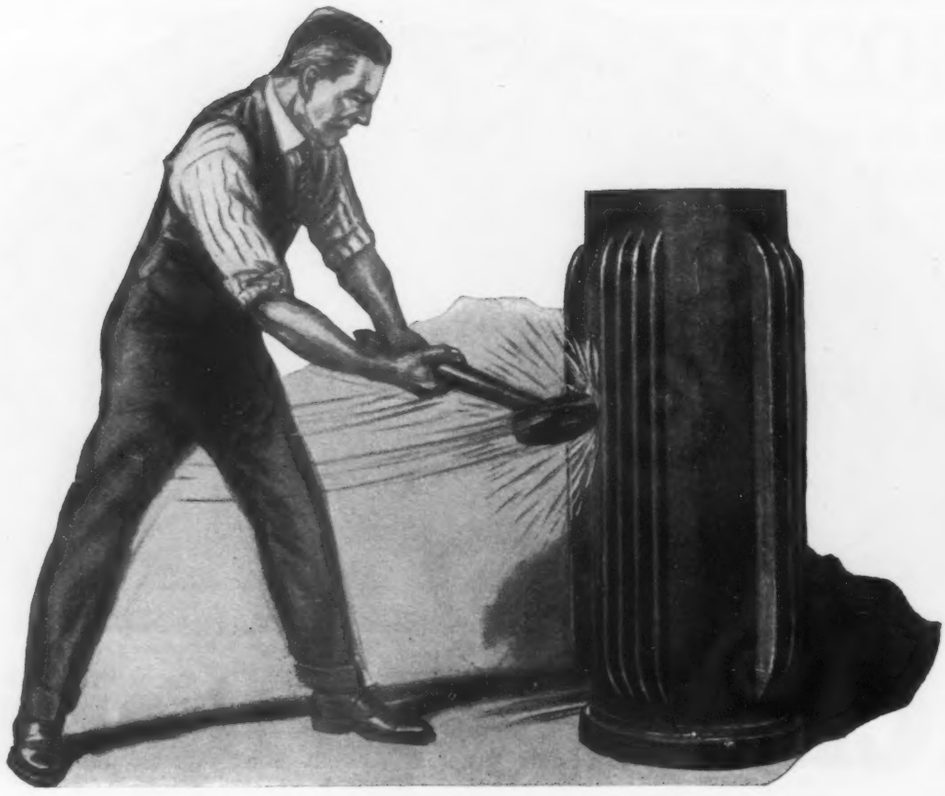
¶ Summing it all up, that's quite some responsibility to rest with one solitary mass of porcelain, isn't it? And the maker of that mass must thoroughly appreciate the responsibility reposed in him, also. He must realize that the product of his labor must be unquestionably perfect. It must be secure and strictly dependable.

¶ The Thomas **LINK-TYPE** Hewlett Insulator, we believe, is perfectly fitted for just such an assignment. We have perfect faith in its ability to carry your burden of worry faithfully. The reputation, the very record of this cementless unit during its many years' service to date is such that **Long Life** and **Dependability** can be considered more than a promise; both are assured. Users of these rugged all-porcelain insulators realize through experience, the true meaning of **Insulator Reliability** and thus enjoy complete faith in their equipment. They can safely **challenge the darkness** without fear

Sold on the Pacific Coast only by

Western Electric Co., Inc.

Thomas Link Type Insulators



Prepared against the hammer blows

The successive hammer blows from the high internal pressures caused by line short circuits or other abnormal operating conditions were anticipated in the design of this new regulator tank.

Not only is it made of thick boiler plate, welded with a single seam to provide the utmost strength, but, because it is round, it distributes the stresses uniformly against its wall and minimizes the probability of bulging or rupture.

The flattened steel tubes welded to the tank increase the efficiency of heat radiation and keep both height and required floor space at a minimum.

For almost two years the G-E Induction Regulator has been proving its merits to operating companies from coast to coast. These companies have verified all the claims made for this improved design. If you are not familiar with this Regulator, get in touch with our specialist in your locality.

General Electric Offers the Latest Develop

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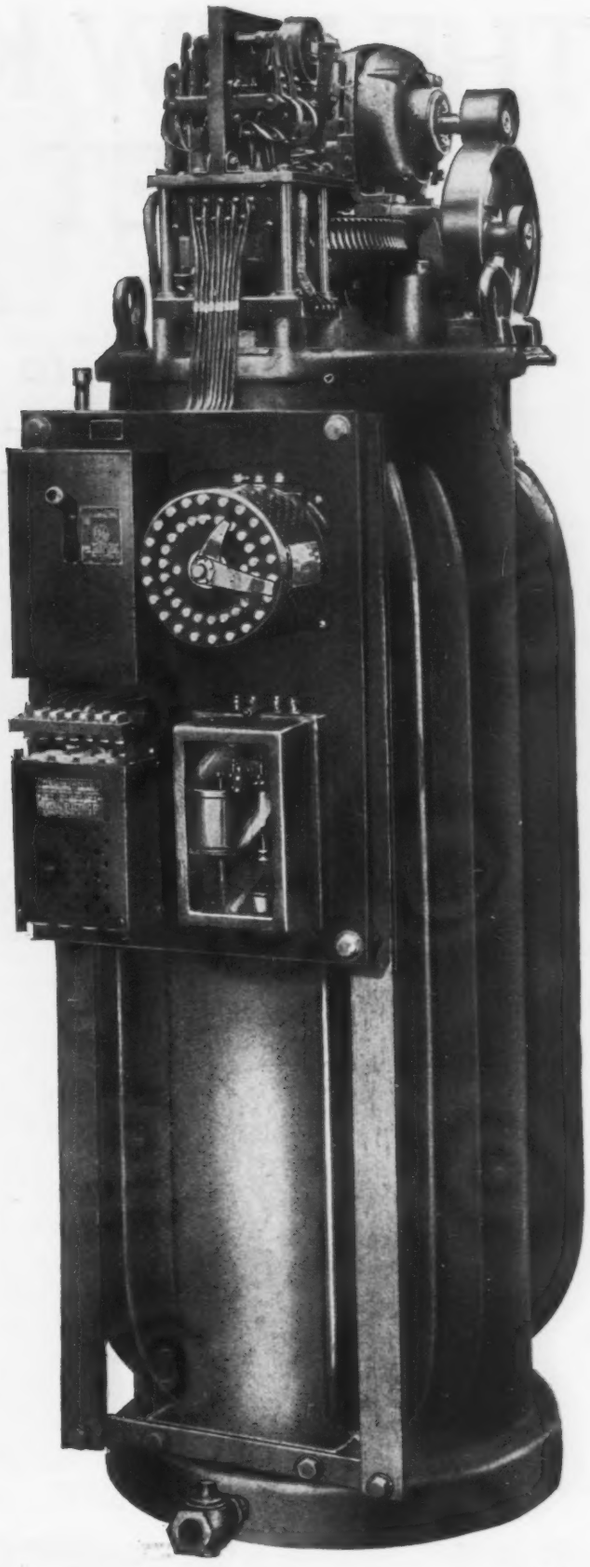
GENERAL ELECTRIC COMPANY, SCHENECTADY, NEW YORK



Three more features equally important:

1 *A sturdy mechanical structure—spider, core and windings all designed for maximum strength and built to insure perfect alignment—gives even longer life and more quiet operation than has characterized G-E Regulators heretofore.*

2 *Low height gives accessibility to the operating mechanism, which is also greatly improved, thereby contributing to the unexcelled operation of this Regulator.*

3 *By virtue of its special high-speed, low-inertia motor with magnetic brake, the G-E Regulator corrects voltage changes more rapidly than any other motor-operated induction regulator.*

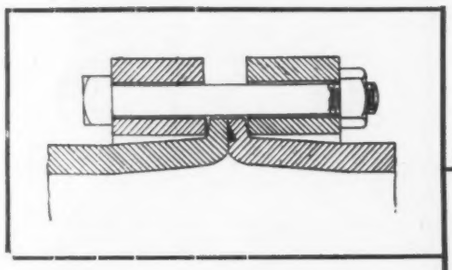
ment in Induction Regulators

19-3

ELECTRIC

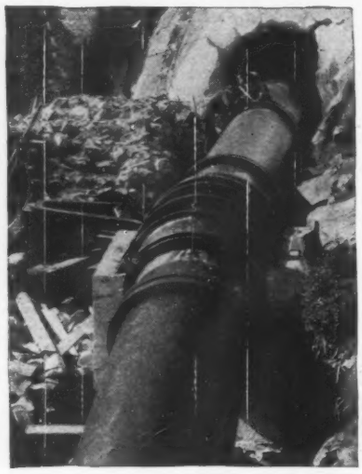
SALES OFFICES IN ALL PRINCIPAL CITIES

THE NEW KELLOGG UPSET LAP JOINT



Especially designed to meet field conditions!

Two views of the upset Lap Joint installed at Big Creek No. 1 and No. 2, Southern California Edison Company.



Meet conditions as they arise—is one way of giving service that counts and that is appreciated. Kellogg engineers saw the need for a piping that could be laid and bolted in the field—by the unskilled labor available only in the remote sections where penstocks are put down.

Hence the New Kellogg Upset Lap Joint—shown herewith.

For quick assembly and where skilled labor cannot be easily obtained—this new joint will meet your requirements exactly.

If you have a penstock problem, let us tell you about this new joint.

M. W. Kellogg Company
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CHICAGO—53 W. Jackson Blvd. ATLANTA—101 Marietta St. Bldg.
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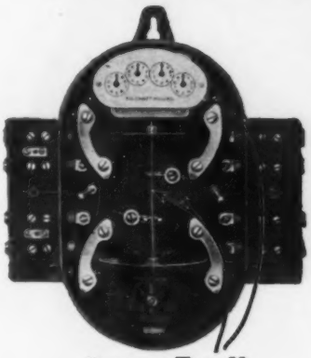
KELLOGG FORGE WELDED PIPE
FORGE WELDED CONTAINERS
POWER PLANT PIPING

Sangamo Type H Single-phase Meter

Consistent Development

FOR eleven years there has been no basic change in the Sangamo Single-phase Watt-hour Meter, and as the various polyphase meters have been developed there have been incorporated into their construction the well-tried single-phase parts wherever they could be used. This practice simplifies maintenance and repairs, reducing the cost of each, and avoids troubles which might arise from changes in design.

How perfectly this practice has been carried out is exemplified by the four meters making up the Sangamo alternating-current line, which are identical in all parts except for details noted below.

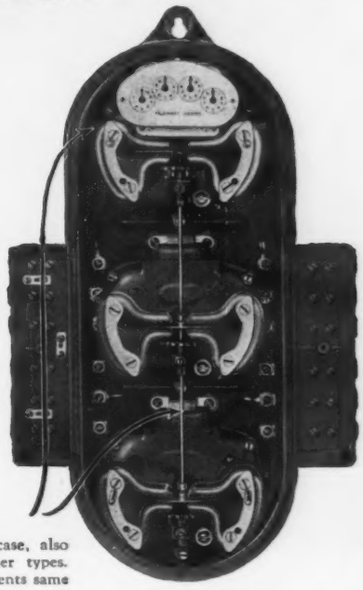


Sangamo Type H Vertical Polyphase Meter

Differs only in base, case, grid and spindle. Employs torque-balancing adjustment same as used on 3-disk meter.

Sangamo Type H Horizontal Polyphase Meter

Has different base and case, also differentially geared register. All other parts are identical with those used in single-phase meter.



Sangamo Type H 4-wire, 3-phase, 3-disk Meter.

Has different base and case, also longer spindle than other types. Torque-balancing adjustments same as used on Vertical Polyphase meter.

SANGAMO

SANGAMO METERS

SANGAMO ELECTRIC COMPANY
Springfield, Illinois
New York · Boston · Chicago · Birmingham · San Francisco · Los Angeles

1023-9

Let's BUILD

build (5)—to increase and strengthen: to increase the power and stability of: to settle or establish and preserve:
—*Webster's*

How can we improve ventilation?

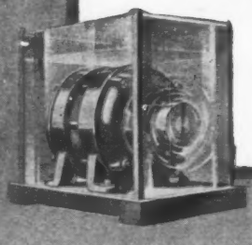
Let's cast a frame with great big holes in it.

Let s cast *nothing*, "Pop"

I've already shown you how we've BUILT a structural steel frame and we got half a dozen distinct advantages over cast iron.

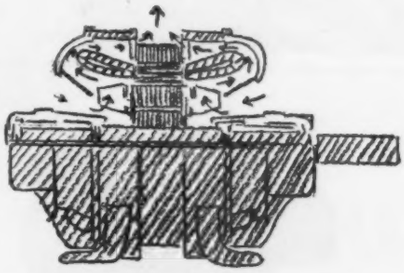
One of them is ventilation.

Let me sketch out for you the course of air currents and the wide air paths, and underneath it put a photo of the structural steel frame showing the big air space for ventilation.



LINC

a motor! with the Stable-Arc welder



Don't you see that a cast frame must have a cross-section at least 2½ times as great as steel, thus cutting down, away down, the air passages in the motor.

You know the dangers of overheating—and you know, too, that the greater the ventilation provided—the cooler the motor.

All right, then, you *can't* get ventilation unless you provide an ample path for it.

And you can't provide an *ample* path with cast iron.

So that's that.

See how this stable arc process helped us as motor *builders* to make a frame from a single piece of angle steel—make it stronger than cast iron, lighter, better, quicker and cheaper—and don't you see how this process could help hundreds of plants, just as it helped ours, to put out an *improved* product that has it over competition like an umbrella.

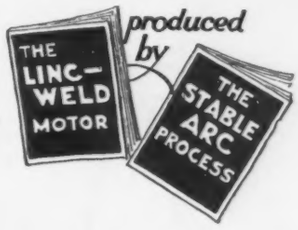
The little coupon in the corner brings the book you want.

The Lincoln Electric Co.

Cleveland, Ohio

Illustrated answers

Realizing that the news value of the new process motor, as well as the process by which it is constructed, will naturally bring up many questions—two very completely illustrated volumes have been prepared thoroughly covering the subjects:



These books are in envelopes ready to be sent by return mail to all persons requesting them.

For your convenience in getting your copies—simply pencil in your address on the coupon below.

-WELD

COUPON

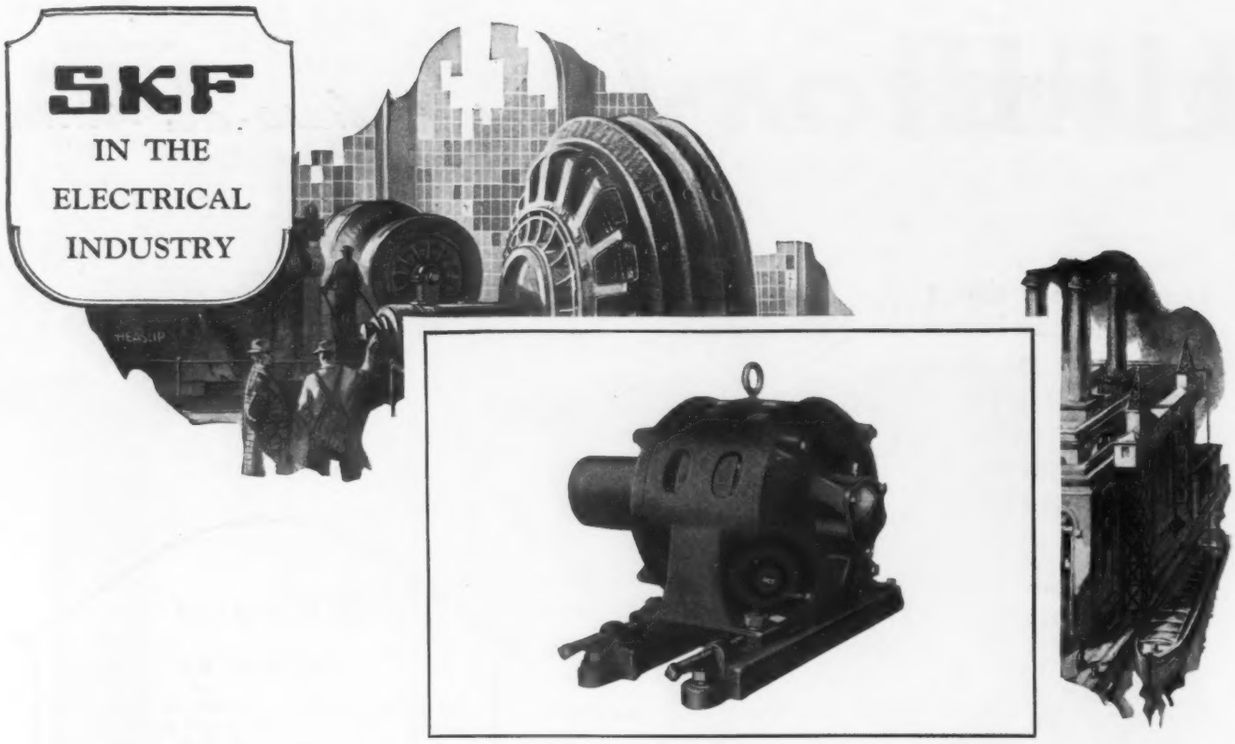
To The Lincoln Electric Co., Cleveland, Ohio

Please send to Mr. .....

Address .....

..... The Motor Book ☐
The Stable Arc Process Book ☐

4-1-1



Savings of Over $4,000 Yearly Made Possible with SKF-Equipped Motors*

Special Certified Survey Sent on Request

1508

OPERATING in an atmosphere filled with sand and emery dust, babbitt bearings on the motors in a large steel casting company had a very short life, entailing excessive repair costs for bearings and armatures.

With the changeover to SKF-marked Ball Bearings, this plant is realizing a yearly saving of over $4,000 in maintenance alone! Fewer men keep the motors in tip-top shape, lubricant and power bills are lower and—what is important—there are fewer delays in production.

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HAS ARRIVED

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SERVEL Units

COMPLETE refrigerators, with built-in SERVEL Refrigerating Machines and Chilling Units, are made in the accepted standard sizes, also SERVEL Refrigerating Machines and Chilling Unit combinations, for installation in all standard refrigerators. The Type-W and Type-A complete SERVEL Electric Refrigerators and the Model "1—1" machine and tank combination, are shown herewith.

Complete SERVEL *Refrigerators*

Model W-6

The Type W is a high-grade refrigerator, made of fine hardwood; it is lined with steel, on which is fused a heavy coating of white porcelain enamel. The outside casing is of selected fine hardwood accurately fitted and finished in snowy white Duco. Insulated with waterproof insulating paper, thick sheet cork, and $\frac{1}{8}$th inch dead air space, it is a highly efficient refrigerator in every way. Heavy self-locking catches wedge the door securely shut. The freezing compartment of the Chilling Tank holds eight partitioned trays, in which may be manufactured eighty cubes of ice at one time.

The Type W is manufactured in two standard models.

Model	*Food Storage Capacity*	*Height*	*Width*	*Depth*
W-6	Six cubic feet	63 inches	36 inches	22 inches
W-9	Nine cubic feet	73 inches	41 inches	24½ inches

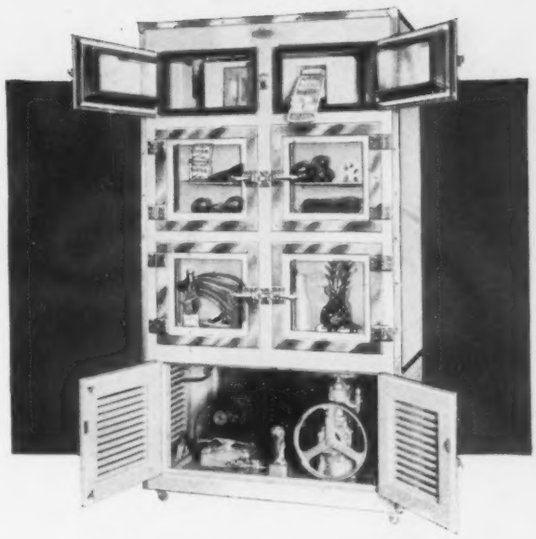
The Type W is equipped with standard doors only.

for Home Use

Model A-9

The Type A is a de luxe refrigerator, metal sheathed, white Duco finish, trimmed with polished aluminum, equipped with heavy brass hinges and roller locks heavily nickeled. It is lined inside with beautiful white porcelain fused on steel. All corners inside are rounded, making the box sanitary and easy to clean. Insulated with two inches of corkboard (the most expensive and effective material) in combination with high-grade waterproof insulating paper and dead air space, a maximum resistance against heat leakage is assured. The freezing compartment of the Chilling Tank holds eight partitioned trays, in which may be manufactured ninety-six cubes of ice at one time.

The Type A is manufactured in three standard models.



Model	*Food Storage Capacity*	*Height*	*Width*	*Depth*
A-6	Six cubic feet	65½ inches	37 inches	24¾ inches
A-9	Nine cubic feet	74¼ inches	41 inches	24¼ inches
A-12	Twelve cubic feet	74½ inches	47 inches	25¼ inches

The Type A is equipped with standard or glass doors to suit the purchaser.

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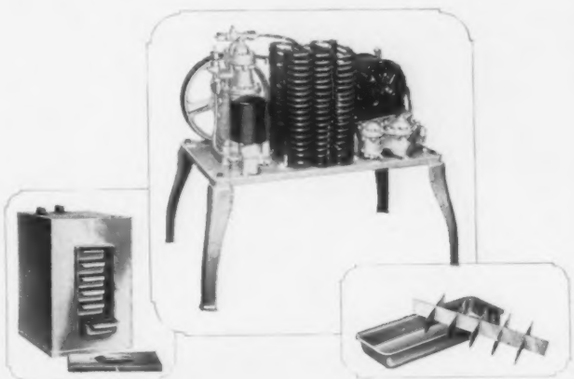

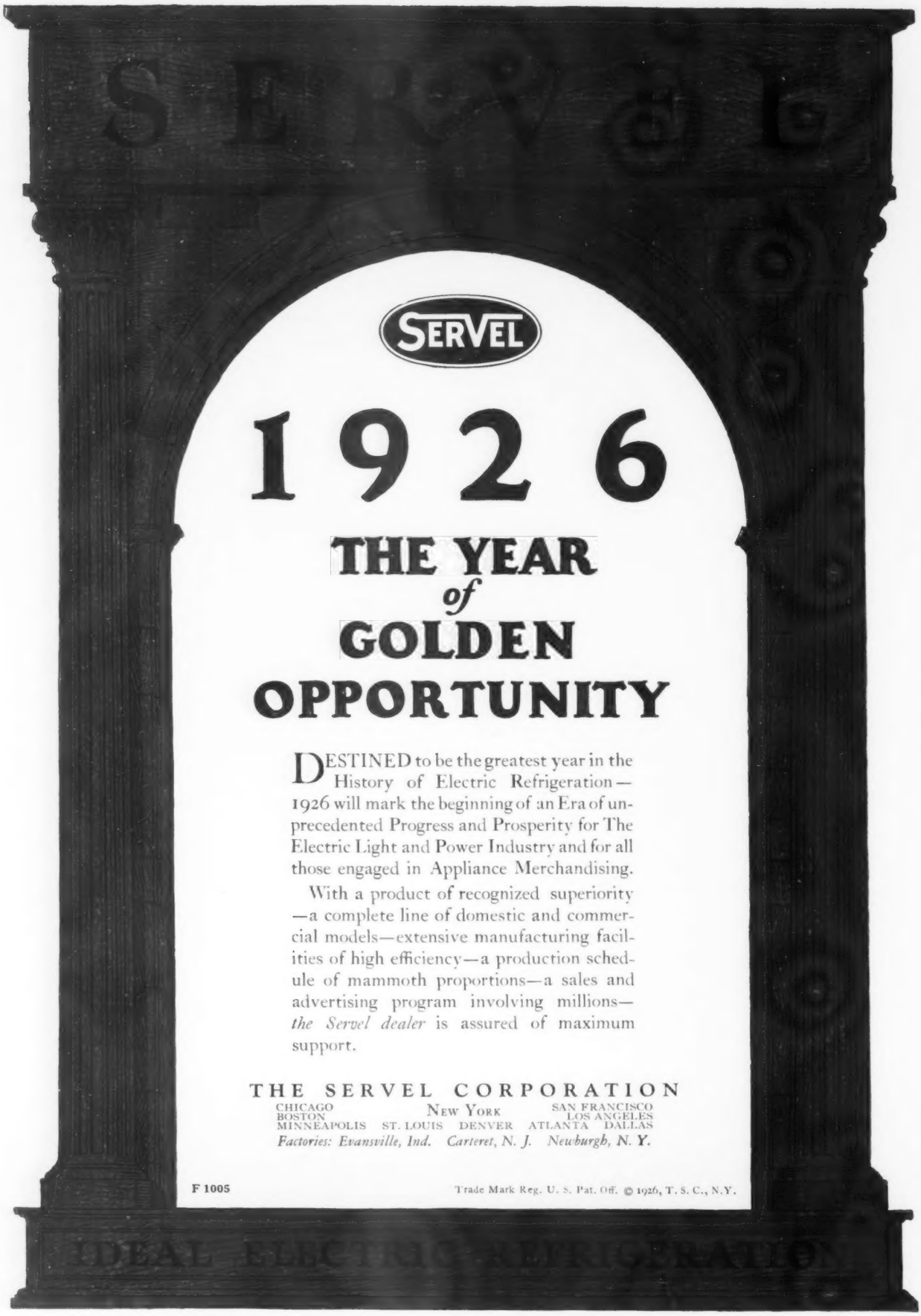
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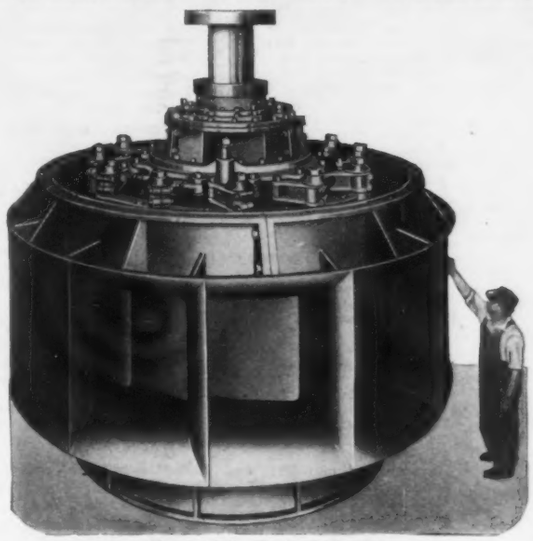

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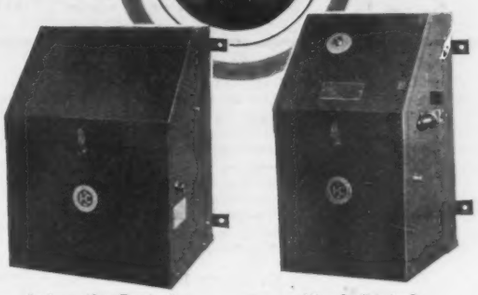

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Montana Electric Co.
Pacific States Electric Co.
Washington El. Supply Co.
Weston El. Instrument Co.

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Alexander & Lavinson Co.
Edison El. Appliance Co.
Electric Appliance Co.
Linderman & Hoverson Co., A. J.
Pacific States Electric Co.
Rathbone Sard & Co.
Standard El. Stove Co.
Western Electric Company
Westinghouse El. & Mfg. Co.

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Ohio Brass Company, The
Western Electric Company
Westinghouse El. & Mfg. Co.

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Pacific States Electric Co.
Wagner Electric Corporation
Western Electric Company
Westinghouse El. & Mfg. Co.

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Curtis Lighting, Inc
Harvey Hubbell, Inc.
Pacific States Electric Co.
Western Electric Company
Westinghouse El. & Mfg. Co.

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Copeland Products Corp.
Electro-Kold Corp., The
Kelvinator Corp.

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General Electric Company
Western Electric Company
Westinghouse El. & Mfg. Co.

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Ward Leonard El. Company
Western Electric Company
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General Electric Company
Hart & Hegeman Mfg. Co.
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Doble Engineering Co.

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De Laval Separator Co., The

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Arrow Electric Co., The
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W. N. Matthews Corp.
Pacific States Electric Co.

Switches, High Tension
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Condit Electrical Mfg. Co.
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General Electric Company
Johnson, T. F., Jr.
K-P-F. Electric Co.
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Baker-Joslyn Company
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Condit Electrical Mfg. Co.
Connecticut Elec. Mfg. Co.
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General Electric Company
Hart & Hegeman Mfg. Co.
Harvey Hubbell, Inc.
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Pass & Seymour, Inc.
Trumbull-Vanderpoel El. Mfg. Co.
Western Electric Company
Westinghouse El. & Mfg. Co.

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Condit Electrical Mfg. Co.
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El. Specialty Co., Inc
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Pacific States Electric Co.
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California Wire & Cable Co.
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Driver-Harris Company

Wire, Galvanized Steel
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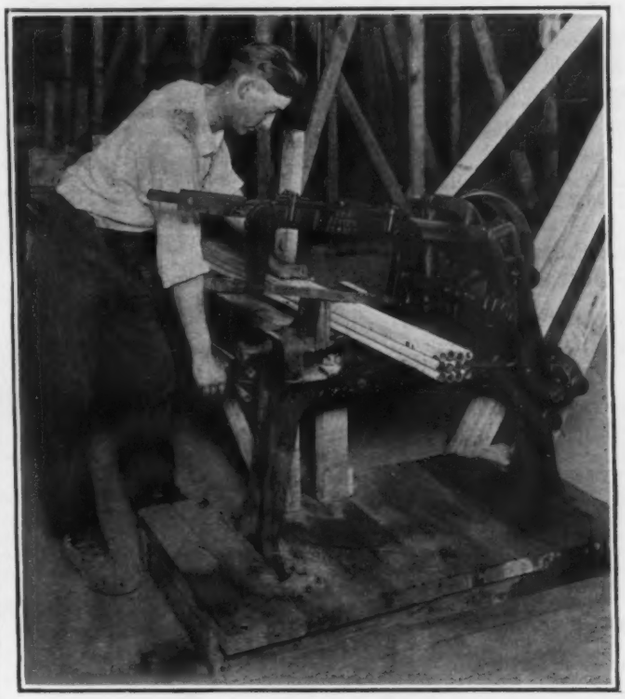

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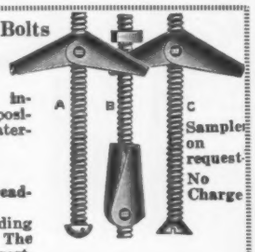
Paine Toggle Bolts



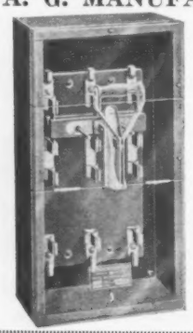
The only spring type toggle on the market. The wings will open instantly in any position in hollow material.
Any style head.
Any length bolt.
Standard bolts threaded to head.
Requires no guiding — just insert — **The spring does the rest.**

Sample on request No Charge

The Paine Company, Chicago, Ill.

Stock Carried: J. J. Noble, 952 Folsom St, San Francisco, Calif. **Rep.,** J. J. Schaller, 257 Spring St., Los Angeles, Calif.

A. G. MANUFACTURING CO.



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Switchboards
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All copper—one piece. Can be drawn up absolutely tight. Highest conductivity. Made from copper and all in one piece. Conforms to latest Underwriters' requirements. Four sizes cover all needs. Only a screw driver needed. Order from your jobber or direct.

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The West will grow—

only in proportion to the progress made in hydroelectric development. Representation in this directory keeps your organization before the industry for consideration in this great development work.

Professional Men!

Why not place your card in this Directory?

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FRICTION TAPE and OK Splicing Compound

for safe permanent jobs

Jobbers in all principal centers

Pacific States Representatives

The GEORGE A. GRAY COMPANY

San Francisco, Calif.

Immediate Deliveries

APPLETON RUBBER CO.

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"INDIANA"

Double Galvanized Telephone and Telegraph Wire

Crapo Patents

Non-Peeling
Non-Cracking

At last the Telephone and Electrical Industry is assured longer life and lower maintenance on galvanized wire construction through our **new** and **improved** patented Galvanizing Process, which insures a wire with Non-Peeling and Non-Cracking Zinc Coating. Now in full commercial production. Carried in stock by Representative **Supply Jobbers.**

Illustration at right shows what happens to old process galvanizing, while illustration at left shows assured results of Crapo process—(patented)

Galvanized Steel Strand

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PHILLIPS WIRE COMPANY

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WIRES AND CABLES

INSULATED WITH RUBBER, PAPER OR CAMBRIC

SIMPLEX WIRE & CABLE Co

MANUFACTURERS

201 DEVONSHIRE ST. BOSTON

CHICAGO SAN FRANCISCO

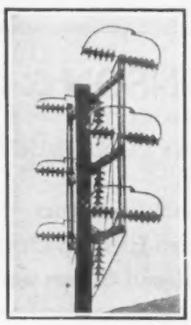
MAKERS OF "TIREX" CABLE AND CORD

See Our Full Page Next Issue

PUT YOUR WIRES ON THE SURFACE WITH

WIREMOLD

THE WIREMAN'S FRIEND



FOR SECTIONALIZING—Specify K-P-F Switches. Manufactured for any voltage. On large hydro-electric developments you will find extensive use of K-P-F high tension switches. They were developed to meet the demand for simple inexpensive switches which could be installed in the circuit at a minimum cost and with little interruption on the line.

Each unit is self-contained. Switches are shipped complete, ready to bolt to cross-arm. Also suitable for steel tower mounting. Write for bulletin 105.

K-P-F ELECTRIC CO.

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Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

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Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 to 4 inches.....$3.50 an inch
5 to 10 inches..... 3.40 an inch
11 to 20 inches..... 3.30 an inch

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

J. of E.

Wanted Competent Appliance Man

Experienced in the sale of washing machines, vacuum cleaners, automatic oil burners, electric refrigerators or similar specialties. Should be experienced in resale work, selling large distributors, central stations, jobbers and dealers.

Must have absolutely clean and successful record and be employed at present. Position will be on contract and will pay liberal salary and over-riding commission. A good man will make from $7,000 to $10,000 a year.

The appliance is new and retails for $100 with 50 per cent discount to large distributors.

It is made by a company of national standing.

Reply in confidence to

Box 519
Journal of Electricity

A MARRIED MAN, age 41, studious, clean thinking, a man that gets joy and results from his work, seeks permanent connection with well organized live electrical establishment. Not an ordinary job but one with responsibility which will pay commensurate for services rendered. Nine years electrical retail managerial experience but will consider any branch of industry. Prefer western location. Your questions solicited. Address Box 776 Journal of Electricity.

MANUFACTURER WANTED

To manufacture and sell Patented Electric Heater in Western States on royalty basis. No competition; only one of its kind on the market.

DOUBLE HEAT ELECTRIC HEATER CO.
47 West 42nd St., New York, N. Y.

IF YOU NEED EQUIPMENT

and don't find it in

the For Sale Pages

PLACE YOUR CARD HERE

Keep Your Eyes on the Searchlight Section and your Ad in it

At Your Service—

A service wherein the man who is seeking a position or the man who is desirous of obtaining trained men; where information can be found concerning either the purchase or disposal of new and used electrical equipment. The purpose of the SEARCHLIGHT section of the Journal of Electricity is to render this service. It simply remains for the men in the electrical industry in the West to apply this service to their needs.

For Every Business Want — Think *Searchlight* First

$180,000,000 Will

FOR manufactured products by the electrical industry of the eleven western states.

$125,000,000 will be spent by central stations for additions to generating and transmission systems in the far West.

$30,000,000 will be spent for electrical appliances to be used in a market where 85.7% of the homes are wired for electrical service.

$25,000,000 will be spent for wiring supplies and fixtures.

* * *

For Advertising Space Reservation

Don't wait to write a letter—

Journal of Electricity

Devoted to the Economic Production and Commercial Application of Electricity
IN THE ELEVEN WESTERN STATES
A McGRAW-HILL PUBLICATION

883 Mission Street **San Francisco, Calif.**

Be Spent in 1926

Where and How

this money will be spent is to be explained in the February 1 —Annual Western Progress Number — Journal of Electricity.

The Men Who Will Spend

this huge sum are the 6,000 subscribers and READERS of the Journal of Electricity that constitute practically 100% of the organized electrical industry of the Eleven Western States.

To reach each of these 6,000 leaders in the electrical industry individually, tell the story of YOUR PRODUCT in the February 1 Journal.

in the February 1 Issue

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